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ABSTRACT

The 10-volume "Health Facts" series is intended to supplement health education curricula and to provide a handy reference for individuals who would like additional background information on particular health topics. The emphasis is placed on topics and examples relevant to youth of middle and high school age. The five sections in this book on disease prevention provide teachers with basic facts about: the differences between health and disease; the concept of prevention; infectious and noninfectious diseases; the relationship between behavior and chronic disease; and mental illness. An easy to read reference format offers clear, concise data intended to familiarize educators with the most important facts about the issues and concerns. A glossary, a list of resources, and 22 references complete the volume. (LL)

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# Disease Prevention

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# Disease Prevention

## HEALTH FACTS

**Lucas Stang**

**and**

**Kathleen R. Miner, PhD, MPH, CHES**

ETR ASSOCIATES
Santa Cruz, California
1994

ETR Associates (Education, Training and Research) is a nonprofit organization committed to fostering the health, well-being and cultural diversity of individuals, families, schools and communities. The publishing program of ETR Associates provides books and materials that empower young people and adults with the skills to make positive health choices. We invite health professionals to learn more about our high-quality publishing, training and research programs by contacting us at P.O. Box 1830, Santa Cruz, CA 95061-1830, 1-800-321-4407.

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# Contents

## *Disease Prevention*


**Editor's Preface** ..... v
**Introduction** ..... ix

**Influences on Health and Disease** ..... 1
Influences on Health ..... 3
What Does Risk Mean? ..... 5
Three Levels of Prevention ..... 6
What Is Disease? ..... 7
Understanding Disease ..... 7
**1-Minute Facts** ..... 10

**Infectious Disease** ..... 11
Fighting Infectious Disease ..... 15
The Importance of Immunization ..... 20
Diseases Prevented by Immunizations ..... 22
Other Infectious Diseases ..... 26
**1-Minute Facts** ..... 34

**Lifestyle Choices and Chronic Disease** ..... 35
A Healthy Lifestyle ..... 36
The Link to Disease ..... 42
**1-Minute Facts** ..... 52

**Other Noninfectious Diseases** ..... 53
Heredity ..... 53
Environment ..... 57
Autoimmune Diseases ..... 58
Diseases with Unknown Causes ..... 60
**1-Minute Facts** ..... 61

**Mental Illnesses** ..... 63
Types of Mental Illness ..... 65
Help for People with Mental Illness ..... 72
**1-Minute Facts** ..... 75

**Glossary** ..... 77
**Resources** ..... 83
**References** ..... 87
**Index** ..... 89

# Editor's Preface

Everyone agrees that children and youth need to learn skills for establishing good health habits. Most people also agree that the earlier health education starts, the better its success.

The books in the *Health Facts* series were written to provide the background information educators need as they teach young people about health. The information is provided in a way that makes it easy for educators to familiarize themselves quickly with the most important facts about a health topic.

Rather than providing indepth information in each content area, the books offer guidance to the balance of emphasis. They help educators approach health topics with confidence and focus health content as they teach.

## Titles in the Series

Each volume in the series contains information about a different content area. The following ten books comprise the series:

- *Disease Prevention*
- *Drug Use Prevention*
- *Environmental and Community Health*
- *Fitness*
- *HIV Prevention*
- *Injury and Violence Prevention*
- *Mental and Emotional Health*
- *Nutrition*
- *Sexuality*
- *STD Prevention*

## Contributors

These books were written by the following talented and knowledgeable professionals in collaboration with ETR Associates' staff.

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## Acknowledgments

We would like to thank the following people, who provided reviews and content expertise.

***John T. Boothby, PhD,*** is an associate professor at San Jose State University in San Jose, California, where he teaches microbiology and immunology.

***Rama Khalsa, PhD,*** is a clinical psychologist and the director of the Santa Cruz County Department of Mental Health in Santa Cruz, California.

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In addition, we would like to thank Mary Nelson, publisher of ETR Associates, for the concept idea, Kathleen Middleton, editor-in-chief of ETR Associates, for her review and conceptualization, and Jill Schettler for her help in editing.

Netha Thacker
Project Editor

# Introduction

*We Americans are healthier today than we have ever been. Our understanding of the causes of health problems has grown enormously, and with it our ability to prevent and treat illness and injury.... Government, business, labor, schools, and health professions must all contribute to the prevention of injury and disease. And all of these efforts must ultimately rely on the individual decisions of millions of Americans—decisions to protect and promote their own health.*

—Jimmy Carter

A fundamental premise for a book on disease prevention is the belief that people can change the things that cause them to get sick and die. By studying disease origins and patterns, people can learn how to avoid illness and enhance health.

During the twentieth century, the scientific study of the biological and environmental causes of disease provided human beings with amazing remedies. Major advancements that have

improved the public's health include antibiotics, vaccines, genetic counseling, and water and sewage management.

Today, Americans no longer fear diagnoses of appendicitis or tonsillitis. Children can be immunized against most childhood diseases, including polio, diphtheria, whooping cough, mumps and measles.

The disappearance of these childhood diseases, coupled with the use of antibiotics and improved sanitation, has lengthened the average life expectancy of Americans. At the turn of the century, a baby born in the United States could be expected to live only 47 years, while a baby born today could be expected to live more than 73 years. Americans cannot afford to lose this phenomenal progress made against eliminating suffering from infectious diseases.

The understanding of health and disease is a dynamic phenomenon. In the latter half of this century, there has been a dramatic shift in the types of illnesses that cause death and disability in the American population.

In 1900, the leading causes of death included influenza, pneumonia, tuberculosis and gastroenteritis. By the early 1990s, the leading causes of disease were noninfectious chronic conditions, such as heart disease and lung cancer; traumatic injuries often caused by violent means; mental illness; and HIV/AIDS.

Chronic diseases are complicated conditions that often involve many body systems. Due to their complexity, it is unlikely that they will be cured by miracle drugs or simple medical procedures.

*Disease Prevention: Health Facts* provides educators with basic information about the disease prevention process. These basics include the differences between health and disease, the concept of prevention, an introduction to infectious and noninfectious diseases, a discussion of the relationship between behavior and chronic disease, and an overview of mental illness.



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## The Role of Education

The research conducted during the past thirty years has offered greater insight into the causes of chronic disease, injury and violence. This research indicates that these conditions are primarily caused by human behavior. What people do or do not do places them at risk of acquiring chronic diseases or experiencing serious injuries.

The behavioral components associated with the modern pattern of disease and injury create the potential for preventing most of these health problems by changing behavior. Comprehensive health promotion and education programs provide the foundation for modern disease prevention.

Ideally, the health promotion and education process begins early. Early education provides the opportunity to reach children and youth before they begin to adopt the behaviors associated with chronic disease, sexually transmitted disease, drug use, injury and mental illness. Through a systematic review of health promotion and disease prevention, educators can help children and youth enhance their health while helping them avoid illness and injury.

## The *Health Facts* Series

*Disease Prevention: Health Facts* is part of a ten-volume series designed to provide clear, concise content and to be complementary to curricula published by ETR Associates and other health education curricula. Other volumes in this series that relate to disease prevention include *Injury and Violence Prevention*, *Mental and Emotional Health*, *STD Prevention*, *HIV Prevention*, *Fitness* and *Nutrition*.

Classroom teachers, counselors, school nurses and others are often called upon to become instant health educators. They may be asked to answer questions, present information and lead discussions on health topics in which they feel unprepared.

The *Health Facts* series is designed to be a handy reference for individuals who would like additional background information on particular health topics. The emphasis is on topics and examples that are relevant to youth of middle and high school age. By design, the presentation of each of the topics is brief. References and resource listings direct the reader to additional relevant information. All of the volumes in this series offer a user-friendly format that is easy to read and factual.

The volumes discuss health and disease in straightforward language. Educators may want to review each volume for its appropriateness for their school and community before assigning the books for student use.

This book and the rest of the series can serve as useful additions to classroom, school or library collections. Health care professionals may choose individual volumes or the entire series as a convenient reference for patient education programs or as reading material in office waiting rooms. Individuals may find the series useful as a home reference as well.

# Influences on Health and Disease

**Myth:** If the United States had more doctors, Americans would be healthier.

***Fact:*** The greatest threat to the health of most Americans is not access to medical care, but lifestyle behaviors, such as smoking, that threaten health.

Traditionally, health has been defined as the absence of illness. A person's state of health was determined by measuring body processes such as temperature and blood pressure.

In 1947, the World Health Organization (WHO) made the first attempt to broaden the definition of wellness, stating: "Health is a state of complete physical, mental and social well-being, and not merely the absence of disease and infirmity." Health, or wellness, is the result of biological heritage and how that heritage interacts with a person's lifestyle and environment. It includes physical, psychological, social and spiritual aspects.

Health is dynamic. It affects everything individuals do and the way they feel about themselves, others and their environment.

Health is constantly subjected to challenges in the environment. To stay healthy, people must respond to internal pressures such as worry, loss of a friend or poor nutrition. They must also adapt to external changes in temperature, situations that result in unintentional injuries, and everyday contact with bacteria and viruses, among other challenges.

## National Health Policy

In 1991, the U.S. Surgeon General's Office issued its *Healthy People 2000* report. This document is a blueprint for the nation's health promotion, health protection and preventive service goals for all Americans by the end of the twentieth century.

*Healthy People 2000* outlines three main goals:

- Increase healthy lifespan—both the number of years a person can expect to live and the quality of life during those years.
- Reduce health inequalities—people from particular groups (age, ethnicity, income or disability) should not be disproportionately affected by health problems.
- Increase availability of preventive services to all—including prenatal care, immunizations, cholesterol and blood pressure screening, and tests for early cancer detection, among others.

# Influences on Health

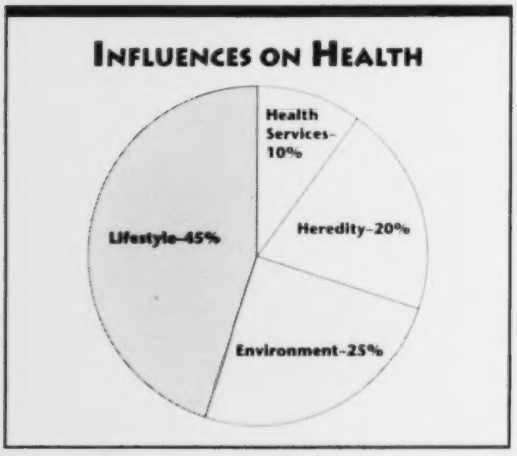
Factors that influence health can be divided into four major groups:

- lifestyle
- environment
- heredity
- health services

■ **Lifestyle** is the most important influence on health. It is responsible for about 45% of health status. Lifestyle refers to the decisions people make about their behavior. It includes diet, sleep, exercise, smoking, drinking and social relationships.

People have almost complete control over the lifestyle choices they make. Studies show that establishing good health habits can improve health, life expectancy and quality of life more than any other factor.

■ **Environment** accounts for about 25% of health status. It includes air and water quality, housing, noise and population density. Fetal environmental factors, such as exposure




*Lifestyle is the most important influence on health.*

to drugs or poor nutrition, can have a lifelong effect on health. Although people have only a limited ability to control environmental risks to health, they can advocate for healthy global environmental policies.

- About 20% of health status is related to **heredity,** the genetic characteristics that people are born with. Although people cannot control their genetic predisposition to disease, they can limit its effects by choosing lifestyles that minimize potential health problems.

- The final 10% of health status is directly related to **health services,** particularly preventive health care. Regular physical and dental exams and immunizations, in addition to early diagnosis and treatment of disease, affect health status. Studies indicate that people with access to medical care have a greater ability to recover from health problems.

**RELATIONSHIPS ARE IMPORTANT FOR HEALTH**

***Close, supportive relationships can help prevent disease and maintain health. Although no one knows exactly how or why relationships protect people from illness, research consistently indicates that they do.***

## What Does Risk Mean?

Risk is a statement of statistical probability. For example, if 95 out of 100 people driving cars make it to their destinations safely but the other five are involved in crashes, the risk of an accident, in this sample, is 5%. However, the risk estimate applies only to the entire group. It doesn't single out an individual driver nor does it guarantee the outcome on future trips made by any of the drivers in the group. Risk is a probability that a health outcome will occur as a result of a particular behavior.

Disease prevention activities attempt to decrease risk by modifying risk factors that have been associated with a health outcome. Changing risk factors, however, does not provide any guarantees. The concept of risk helps people make decisions about their behavior that decrease the odds they will experience a particular disease or injury.

### Leading Causes of Death in the United States

| Cause of Death | Deaths per 100,000 |
|---|---|
| Heart disease | 295.6 |
| Cancer | 199.9 |
| Stroke | 58.6 |
| Unintentional injury | 38.3 |
| Chronic obstructive pulmonary disease | 34.0 |
| Pneumonia | 30.8 |
| Diabetes | 18.9 |
| Suicide | 12.2 |
| Chronic liver disease, cirrhosis | 10.8 |
| Homicide and legal intervention | 9.2 |

Source: U.S. National Center for Health Statistics. 1992. *Vital Statistics of the United States,* annual, and unpublished data. As reprinted in *Statistical Abstract of the United States: 1992.* 112th ed. Washington, DC: U.S. Bureau of the Census.

## Three Levels of Prevention

Understanding the factors that influence health status helps individuals and society make decisions that help prevent death, disability and loss of productivity due to disease and injury. Individuals and health care agencies can take steps to help prevent the negative effects of disease or injury. These steps can be organized into three general categories—primary, secondary and tertiary prevention.

- **Primary prevention** activities help prevent disease from ever occurring in the first place. For example, not smoking cigarettes reduces a person's risk of developing lung cancer or heart disease. Immunizing children prevents them from contracting polio, diphtheria and other diseases for which vaccines have been developed. The goal of health education is promotion of health maintenance behaviors, such as exercise, healthy eating and safer sex practices, to prevent disease.

- **Secondary prevention** activities can detect disease early, thereby decreasing the severity and duration of an illness. Annual checkups, prenatal care and cholesterol testing are examples of secondary prevention.

- **Tertiary prevention** activities help people recover from diseases and prevent the diseases from recurring. For example, someone who has had a back injury can do exercises to strengthen the back and wear a back support during activities that might strain it. Alcohol or other drug rehabilitation programs are also tertiary prevention activities.

## What Is Disease?

If health is the ability to function in harmony with one's environment and to meet the physical, psychological and emotional demands of daily life, disease is any inability to do so. For example, someone who is in top physical condition but is also angry or frustrated cannot be considered completely healthy.

Although the terms *illness* and *disease* are often used interchangeably, they are not the same thing. An individual can have a disease for many years without knowing it. This person is diseased but not ill. A diabetic who receives insulin is not ill, but does have a disease.

The term *illness* implies some level of discomfort or apparent disease symptoms. Illness can result from the following factors:

- bodily insult, either physical, chemical or mental (e.g., a broken bone, acid burn, head injury)
- contact with an infectious agent (e.g., flu, tuberculosis)
- as a secondary effect of another condition, disease, nutritional or chemical imbalance, or mental state (e.g., kidney failure, hypertension)
- a genetic condition (e.g., sickle cell anemia, Down syndrome)

## Understanding Disease

The following terms are useful in understanding disease and disease prevention.

- **Infectious diseases** are diseases caused by living organisms, or *pathogens*, such as bacteria or viruses. Infectious diseases can be described as either *communicable* or *noncommunicable*, depending on their mode of transmission.

- **Communicable,** or contagious, diseases such as colds, influenza or malaria are spread from one person to another either directly or indirectly by a carrier.
- **Noncommunicable** infectious diseases are caused by organisms that normally live in the body and only occasionally cause disease, as in thrush, or by organisms that live outside the body and cause disease only when introduced into the body, as in tetanus.

■ **Noninfectious diseases** are not caused by living organisms. The most important noninfectious diseases in the United States are chronic diseases such as heart disease.

■ **Chronic diseases** start slowly and develop over a period of years. They can be infectious, as in tuberculosis or HIV, or noninfectious, as in diabetes or asthma.

■ **Endemic diseases** occur in a particular population over a long period of time. They can be infectious, such as valley fever in the southwestern United States, or noninfectious, such as Tay-Sachs disease in Eastern European Jews.

■ **Epidemic diseases** are outbreaks of disease that exceed the expected number of cases of the disease, such as outbreaks of polio or lung cancer.

■ **Pandemic disease** is a disease outbreak that has spread over a larger area than an epidemic, as in a global influenza pandemic.

## Epidemiology

Epidemiology is the study of the distribution of disease in certain populations and the factors that influence the occurrence of disease. It looks at the factors shared by those who got the disease in comparison with those who didn't get the disease. It considers person, place and time, as in the following questions:

- Who is likely to get the disease?
- Where is the disease most likely to occur?
- When is the disease most likely to occur?

Epidemiology helps identify the personal characteristics and environmental factors that increase the risk of disease. It has helped to explain the transmission of infectious diseases such as cholera and measles and has contributed to the understanding of factors that increase the risk of chronic disease, such as heart disease and cancer. In some cases, it has helped identify the source of disease, for example, Lyme disease.

# 1-Minute Facts

- Traditionally, health has been defined as the absence of disease. However, health includes physical, psychological, social and spiritual aspects.

- Factors that influence health can be divided into four major groups: lifestyle, environment, heredity and health services. Of these, lifestyle is the most important influence on health.

- The three levels of prevention of health problems are primary, secondary and tertiary.

- Risk is a probability that a health outcome will occur as a result of behavior. Disease prevention activities attempt to decrease risk.

- Disease is any inability to meet the demands of daily life. Illness implies some level of discomfort or disease symptoms.

- A variety of terms are used to describe disease.

# Infectious Disease

**Myth:** Antibiotics cure most infections.

***Fact:*** Antibiotics are important disease-fighting tools. However, they are not effective against viruses. Even some bacterial infections are becoming resistant to available antibiotics.

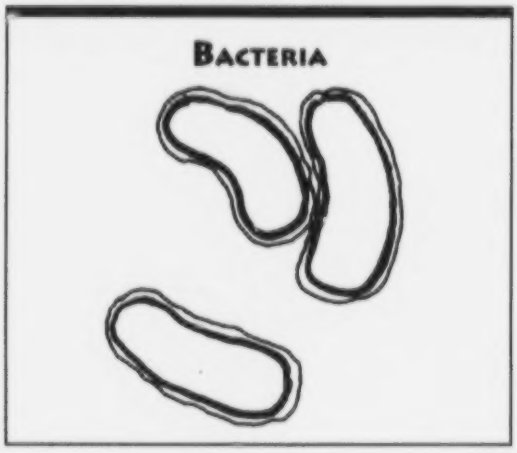
Infectious diseases are caused by living organisms that are usually spread from one person to another in various ways. These organisms are found all around us. Humans are literally swimming in a sea of microorganisms.

Most of these living organisms are not harmful. In fact, many perform important helpful functions. Some cause disease and illness. These are called *germs* or *pathogens*. The following pathogens are primary causes of infectious disease:

- bacteria
- viruses

- rickettsia
- fungi
- parasites

■ **Bacteria** are single-celled organisms, small amounts of living matter surrounded by a thin cell wall. They are not plants, animals or fungi, but are classified in a separate group called *monera*. Unlike other kinds of cells, bacteria do not have a nucleus.




*Bacteria are single-celled organisms.*

Most bacteria are colorless, with characteristic shapes like balls, rods or corkscrews. They are classified by shape. The bacterium that causes strep throat, for example, is a coccal or ball-shaped organism, thus its name *streptococcus*.

Bacteria reproduce by dividing in two, becoming two, then four, then eight, sixteen, thirty-two, and so on. If temperature and food conditions are right, one bacterium can become a colony of more than 1 million cells in less than a day.

As bacteria grow, they release byproducts of their metabolism. Some of these byproducts are poisonous to humans

and will make people sick. Such byproducts are called *toxins*. Some toxins attack specific body cells. Tetanus bacteria, for example, secrete a toxin that affects nerve cells.

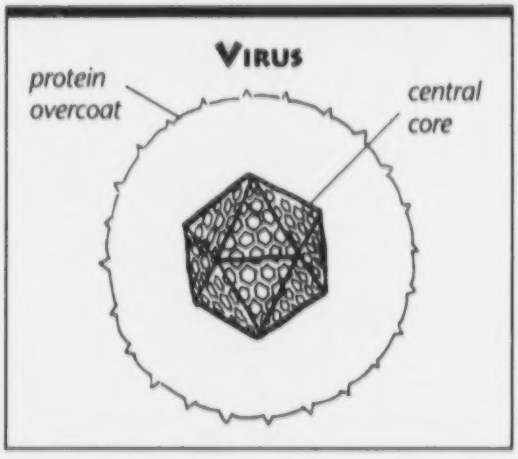
Most bacterial diseases can be treated with *antibiotics*. *Vaccines* are available for many of the most dangerous bacteria.

■ **Viruses** are the smallest known living things. If 2 million viruses were placed in a row, their combined length would be less than half an inch. These pathogens can only be seen with a powerful electron microscope.

Viruses are the only pathogens that are not cells. They consist of a central core inside a protein overcoat. Viruses only live in a living host cell. They use the host cell's food and energy.

Viruses cannot multiply by themselves. They need to use the reproductive structures of host cells. Once they take over a cell, they can cause it to produce new viruses. Eventually, the cell bursts open and releases hundreds of virus particles, which will then infect other cells.

Viral diseases are hard to treat because it is difficult to kill the virus without also killing the host cell, which is why




*Viruses differ from one another in size and shape.*

antibiotic drugs don't work. Viruses can also change, or *mutate*, which limits the use of many medications.

Some viral diseases, such as measles, polio and smallpox, can be prevented with vaccines.

- **Rickettsia** are small, bacteria-like organisms midway in size between bacteria and viruses. Like viruses, they cannot reproduce on their own but require a host's cells. Inside a human host, rickettsia live in the small blood vessels and cause high fevers, skin rashes and other symptoms.

  Rickettsia are commonly found in ticks, fleas and lice, which carry the organisms with no ill effect. Rickettsia are transmitted to humans by bites of the carriers or by contact with the carriers' feces. They cause diseases such as Rocky Mountain spotted fever.

- **Fungi** form a diverse group of living organisms that are neither plants nor animals. Most fungi are very useful, not harmful.

  Some types of mushrooms and yeast are edible fungi. Fungi cause wood to rot and dead plants and animals to decay. Penicillin is made from a fungus mold that grows on fruit. Only a few of the 100,000 known species of fungi cause human diseases.

  Fungi are responsible for some skin diseases, such as ringworm and athlete's foot, and certain lung diseases. Fungal diseases can be hard to control and take time to treat, but they are rarely life threatening.

- **Parasites** are relatively large organisms, and many of them can be seen without a microscope. Other parasites are small protozoans that do require a microscope to be seen. They live by feeding on or in another animal. Parasites can enter the body through infected water and food, and often live in the intestines. They cause diseases such as malaria and trichinosis.

# Fighting Infectious Disease

Humans are well adapted to defend themselves against pathogens. They have developed a sophisticated and sturdy immune system that, either naturally or through vaccines, protects them from disease organisms.

## The Infectious Cycle

Germs require certain conditions to cause disease or illness. Interrupting the cycle at any point can stop the spread of infectious diseases. The following factors are essential to the infectious cycle.

- **Pathogen:** a disease-causing organism, e.g., virus, bacterium.
- **Reservoir:** an alternate host or environment where pathogens can grow and thrive, e.g., air, animals, soil, water.
- **Portal of exit:** a way to leave the reservoir, e.g., droplets from the nose, genital secretions.
- **Mode of transmission:** the means by which germs come into contact with a person, e.g., sexual contact.
- **Portal of entry:** a place where germs can enter the body, e.g., nose, mouth, genitals, a wound.
- **Incubation:** the time lapse between infection and onset of symptoms; may be hours, days or years depending on the specific disease.
- **Period of communicability:** the length of time a disease is most contagious.
- **Susceptible host:** a reservoir that is vulnerable to the disease. Exposure to disease organisms results in illness only when the host is vulnerable.

## *Natural Defenses*

The human inborn disease-fighting system has five components. Some of these components react in nonspecific ways to discourage infections; others fight against particular pathogens. These five components are

- species-specific resistance
- mechanical barriers to infection
- chemical defenses
- white blood cells
- the inflammatory response

■ **Species-specific resistance:** Different species of animals simply are not susceptible to the same diseases. For example, humans do not get sick from some infections that may kill birds, reptiles or even other mammals.

■ **Mechanical barriers to infection:** Human skin is a formidable barrier to microbes. Most pathogens cannot penetrate intact skin. The skin's cells are constantly being shed and renewed, and glands secrete oils that kill bacteria.

The tissues that line the respiratory and gastrointestinal tracts also provide a tough barrier to germs. Cells in these tissues secrete mucus that traps tiny particles. Hairlike structures called *cilia* propel the mucus, which contains natural antibiotics, out of the nose and mouth. The stomach lining secretes acid that kills microorganisms.

■ **Chemical defenses:** Once pathogens penetrate the skin barrier, they are attacked by chemicals produced by a variety of body cells. For example, cells infected by viruses produce *interferons*, a family of proteins that protect neighboring host cells from viruses.

- **White blood cells:** These special cells, which are located throughout the body, have the ability to kill pathogens. Some white blood cells, called *phagocytes*, can find, engulf and destroy foreign particles. These cells can migrate through blood-vessel walls to fight infection. They are also found as specialized cells within tissues. These cells are particularly abundant in the spleen, liver, lymph nodes and bone marrow.

- **The inflammatory response** refers to the body's ability to concentrate phagocytes and other white blood cells and its chemical defenses in an area of infection.

## The Role of Antibiotics

Antibiotics are drugs that destroy or inhibit the growth of infectious organisms in the body. They act on bacteria without killing the body cells that are infected. However, antibiotics are not effective against viruses.

The first antibiotic, penicillin, was discovered by accident in 1928. Dr. Alexander Fleming noticed that his culture of bacteria had been contaminated by mold. He noticed that where this penicillin mold grew, the germs died.

Bacteria can become resistant to antibiotics. Then the infections caused by these bacteria are more difficult to cure. This resistance can occur when one drug is used too often to treat specific illnesses, or when a drug is underused, as when patients do not finish all of their prescribed medicine.

## *The Immune Response*

The five natural defense mechanisms are general responses to infection, but the body also reacts to specific invading pathogens and the toxins they may release. The immune response involves groups of special cells that can recognize and deactivate disease organisms. These cells can remember disease organisms to prevent future infection by the same pathogen. The immune response involves the following components:

- lymphocytes
- B-cells
- T-cells

■ **Lymphocytes** are white blood cells that originate in the bone marrow. They are small round cells with large nuclei. Adults have about 2 trillion of these cells at any given time.

Lymphocytes generally lie dormant in bone marrow, spleen, tonsils, thymus, lymph nodes and intestinal lining. When signaled to action by the presence of foreign material or infecting pathogens, they can move quickly to the affected site.

Before reaching maturity, lymphocytes are released from the bone marrow and circulated throughout the body. About half end up in the thymus and become *T-cells*, and half will return to the bone marrow to mature and become *B-cells*.

*Antigens* cause the immune system to react when they enter the body. They are important components of bacteria and viruses. Both T-cells and B-cells have receptor molecules on their surfaces that can recognize and bind to these antigens to destroy them. However, these two cell types react to antigens in different ways.

■ **B-cells** combat antigens by making substances called *immunoglobulins*, or *antibodies*. Antibodies attach to antigens and render them harmless. Antibodies are very specific. Each antibody "fits" only one type of antigen, the way only one key fits a particular lock. B-cells' response to disease is called *antibody-mediated immunity*.

Some B-cells multiply rapidly during an infection but do not make antibodies at that time. Instead, the cells remain in the tissue or circulatory system for months or years. If these cells encounter the same antigen again, they act as if they remember it. They begin to make and release the specific antibody rapidly so that the antigen is destroyed before it can cause illness. This process is known as *active immunity*.

■ **T-cells** attach themselves directly to invading toxins or microorganisms and destroy the antigens. They recognize cells in which pathogens are growing and attract white blood cells to these areas to fight the infection. This type of immunity is called *cell-mediated immunity*. It is especially important in combating viruses, which can spread directly from cell to cell.

There are three types of T-cells:

- **Helper T-cells** stimulate the development of B-cells or other T-cells.
- **Suppressor T-cells** inhibit the growth of certain cell types and are responsible for turning off the immune response after an infection is contained.
- **Killer T-cells** attack pathogens that normal phagocytes, T-cells and B-cells can't handle. Killer cells seem to inject something that causes cells to burst, particularly cells infected by viruses. They may also be important in protecting against a variety of cancers.

### Fever

A fever is an abnormal rise in body temperature. It usually indicates infection, but it can also occur with burns or other causes of tissue damage.

A fever can be a good sign. Many pathogens cannot reproduce quickly at higher temperatures. The inflammatory response, which indicates that white blood cells are collecting at the site of infection, causes body temperature to rise. A fever indicates that the body is fighting disease.

## The Importance of Immunization

The development of vaccines during the past century has dramatically reduced the incidence of contagious diseases and their destructive effects. Smallpox, once the world's deadliest disease, has been eliminated. Diphtheria, polio, whooping cough, tetanus and others have been brought under control.

Vaccines create artificial immunity by stimulating the immune system to produce antibodies and cell-mediated immunity that inactivate disease-causing organisms. Vaccines are safe because they contain modified or weak strains of the microbes (or the toxins they create) that aren't strong enough to cause the disease but still cause the immune system to make antibodies and cell-mediated immunity.

Studies show that about 90% of American children are immunized against the leading contagious diseases. But as long as even a few cases of a disease occur within a population, people who are not immunized are susceptible. Measles and whooping cough are two diseases that are recurring today because not everyone has been immunized against them.

Some types of immunity need to be maintained by additional vaccinations. People who are immunized against tetanus and diphtheria as children must receive periodic "booster" shots for full protection. Studies indicate that nearly half of American adults are not up-to-date on their boosters.

Some people do not get vaccines because they are unsure about the safety and effectiveness of newer vaccines. For example, only about 20% of the people who should be getting influenza vaccines are getting them.

The American Academy of Pediatrics, the American College of Physicians and the federal Centers for Disease Control and Prevention all endorse modern vaccines as extremely safe, effective and important to individual and public health efforts. Some vaccines can cause some adverse effects in some people. Such effects are usually temporary and mild.

Reactions to a vaccine may include local soreness and redness, fever and/or joint discomfort. The chances of a healthy person experiencing a severe reaction, such as convulsions or paralysis, are extremely small. Overall, the benefits of immunization far outweigh the risks.

### FIGHTING POLIO

***In the United States, vaccination has almost eliminated polio, an infectious viral disease that can cause paralysis. In 1952, more than 57,000 cases of polio were reported in the United States; in 1987, only five cases were reported. However, more than 250,000 cases continue to occur annually worldwide.***

## Diseases Prevented by Immunizations

The following infectious diseases can be prevented by vaccines.

- **Diphtheria** is spread by airborne bacteria that release toxins that can attack the heart and other organs. Widespread childhood immunization has almost eliminated diphtheria in the United States.

  An adult who was not immunized as a child should be immunized immediately. A booster is required every ten years to maintain immunity. The booster vaccine is often combined with tetanus toxoid and is called Td.

- **Tetanus** occurs when tetanus bacteria enter a deep wound. The tetanus organism lives in soil, especially soil that has been treated with manure. A powerful toxin released into the bloodstream causes painful muscle contractions that can lead to death. This toxin is more virulent than snake venom. About 100 cases of tetanus per year are still reported in the United States.

  Adults should receive a booster every ten years. An additional shot may be recommended after incurring a deep wound that is contaminated with material likely to harbor the bacteria if the wounded individual has not been reimmunized within the past five years.

- **Pertussis,** or whooping cough, is a serious disease that causes violent fits of coughing. It is especially damaging, and sometimes fatal, to young children.

  Pertussis is a threat to anyone not immunized. About 2,000 cases of whooping cough, with four to ten deaths, occur annually in the United States. The vaccine is usually combined with the diphtheria and tetanus vaccines to create a serum called DPT.

■ **Influenza** is a serious, highly contagious infection of the respiratory system caused by any of several groups of viruses. Influenza is transmitted from person to person through the respiratory tract, particularly by inhaling infected droplets from coughing or sneezing.

Each type of influenza virus causes similar symptoms, but because the viruses are genetically different, infection with one type does not produce immunity to others. Even immunity to a particular strain is temporary because viruses change over time.

Because influenza viruses change from year to year, annual vaccinations are required. The vaccines are adjusted annually to contain the viruses that are expected to be prevalent that year. Shots are strongly recommended for those whose risk of serious infection is high. Those at high risk include:

- anyone over age 65
- anyone with asthma; chronic pulmonary, heart or kidney disease; or diabetes
- anyone with exceptional chances of exposure, such as health care workers

**A DANGEROUS DRUG**

***Aspirin should never be given to children and youth under age 16. Giving children under age 16 aspirin during a viral infection, such as flu or chicken pox, is believed to trigger Reye's syndrome, a rare but life-threatening disease. The incidence of Reye's syndrome is higher in teenagers who treat themselves using over-the-counter medications containing aspirin.***

- **Pneumococcal pneumonia** is an inflammation of the lungs caused by bacteria. It is transmitted in the air or by contact with contaminated sputum.

  A new vaccine is available that is effective against the 23 strains of bacteria that cause about 80% of nationwide cases of pneumococcal diseases. The same groups immunized for influenza should also receive this vaccine, which is required only once for lifetime protection.

- **Measles,** or **rubeola,** is the most serious childhood infectious disease and is responsible for about 1 million deaths per year worldwide. It is caused by a virus that produces a *systemic* (throughout the body) infection. Measles is highly contagious.

  People who have had measles are then immune for life. Many adults have natural immunity to measles because they were infected and recovered during childhood. But a large number of people born after 1957 have neither had the disease nor been immunized.

  An effective vaccine is available and has been widely used in the United States since the 1960s. However, compliance with immunization recommendations has declined in recent years, and the number of reported cases has risen.

- **Rubella,** also known as **German measles**, is also a contagious viral disease. It is so mild in children that there may be no symptoms at all.

  However, rubella is a very serious disease during pregnancy. Women who are infected during their first trimester give birth to babies with heart defects, deafness and mental retardation.

  Rubella is totally preventable by immunization. All children and adults who did not have the disease as children should be vaccinated.

- **Mumps** is a viral infection of the salivary glands, including the parotid gland located near the ear. The disease generally affects children, but infection can occur in adults as well. A single attack usually confers lifelong immunity.

  Mumps is not very contagious but does tend to occur in periodic epidemics. Mumps can be a serious infection in adults, especially males, because the virus can cause infection in the reproductive organs, including the testes. This infection can be very painful and can result in sterility. The disease is completely preventable by vaccination.

- **Hepatitis B** is a blood-borne liver disease caused by a virus. Anyone who comes in regular contact with blood or blood products should be immunized, as well as injection drug users and family members or sexual partners of infected individuals.

  The vaccine is given in three parts: the first two doses are given one month apart, and the third dose is given five months after the second. Immunity does decrease over time, but a booster schedule has not yet been established.

## Other Infectious Diseases

- **Common colds,** also known as *viral rhinitis*, are seldom serious. At least 200 different cold viruses exist; the most common are *rhinoviruses* (nose viruses). This variety means that many people can have the same symptoms but be infected with different viruses.

  The easiest way to get a cold is by getting the virus directly in the nose, where temperature and humidity create an ideal growth environment. The virus can get inside the nose by breathing in air contaminated by the sneezing or coughing of others, by touching someone who has the virus and then touching one's own eyes or nose, and by contact with a telephone, cup or other article used by someone who has the virus.

  Because a cold is a viral infection, antibiotics do nothing to help cure it, although they may help prevent a secondary infection. Common cold medications may relieve symptoms, but they don't act on the viruses that cause the disease. Most colds will cure themselves in about a week.

  The best way to avoid colds is regular hand washing with soap and water. People should avoid putting fingers to the nose or eyes and try not to share objects such as drinking glasses, pencils or tools with cold sufferers.

### Understanding Cold Medications

**Decongestants** work by constricting blood vessels and temporarily opening the nasal passages. They also can dry up mucus. They are available in pill and liquid forms or as nose drops or inhalers. If overused, nasal spray decongestants can actually increase swelling and congestion—known as a rebound effect.

**Antihistamines** are effective for hay fever, but often don't help colds. They dry secretions by thickening mucus, which will increase congestion and make the mucus difficult to expel by coughing. Many antihistamines can cause drowsiness.

- **Chickenpox** is a highly contagious viral disease that causes fever and a rash. It is easily transmitted from person to person by direct contact or by droplets or airborne secretions from an infected person. It is rarely a serious disease for children, and infection leads to immunity. However, chickenpox can be severe in adults who were not infected as children.

- **Mononucleosis** is a viral infection common among teenagers and young adults. It is characterized by fever and enlarged lymph nodes and spleen. The virus, which is spread by direct contact with an infected person, causes fatigue, lack of appetite and a sore throat.

  The illness lasts three to six weeks, but patients may continue to feel tired throughout the recovery stage, which can last a few months. Although treatment can help relieve some of the symptoms, there is no medical cure.

- **Hepatitis** literally means inflammation of the liver. It can be caused by a variety of organisms, by drugs or by exposure to toxic chemicals. Viral hepatitis generally falls into one of three categories: type A, type B, and type C (formerly called non-A, non-B). Each type is caused by a different virus, and each is spread, treated and prevented differently.
  - **Hepatitis A,** or **HAV,** lives in the intestinal tract and is acquired by fecal contamination. It can be spread by food preparers who don't wash their hands and by sexual partners who engage in oral/anal activities. But the most common method of transmission is eating shellfish from water contaminated with sewage.

    Good hygiene and a little caution can substantially lower the risk of contracting HAV. Hands should be washed in soap and water before preparing food. Shellfish should be thoroughly cooked before eating.

- **Hepatitis B**, or **HBV**, is transmitted via infected blood and blood products. Medical personnel and those who share needles to inject drugs are at high risk for HBV. Needles used for tattooing and acupuncture can also contain contaminated blood. Blood transfusions used to be a prime source of HBV, but today blood donations are screened for this virus.

  HBV can also be spread sexually because the virus is present in body secretions such as saliva, semen and menstrual blood. Anyone who engages in sex with multiple partners has an increased risk of contracting HBV. A vaccine against HBV is available.
- **Hepatitis C** is caused by several types of viruses. All are blood-borne and are spread typically by transfusions. At present, there are no blood donor screening tests available for these viruses.

HBV and hepatitis C can be avoided by avoiding any activity that allows contact with contaminated blood or other body secretions. Practicing safer sex, limiting the number of sexual partners and not sharing needles are ways to lower one's risk for these viruses.

■ **Herpes simplex** affects about 30 million Americans. It is caused by two types of virus: type I commonly produces cold sores around the mouth, and type II produces sores on or around the genitals. But both viruses can infect either area.

Once a person becomes infected, the virus lives in the body for the rest of the individual's life. It hides in the nerve endings where the immune system cannot find it. Periodically, the virus becomes active and the sores reappear. Recurrences can be triggered by fever, other viral infections, fatigue, menstruation, and even sun and wind.

The viruses are transmitted by direct contact with an active sore or virus-containing genital secretions. There is no cure for herpes, and the virus does not respond to antibiotics.

- **Human immunodeficiency virus,** or **HIV**, infects the cells of the immune system and leads to the illnesses associated with AIDS. HIV can be sexually transmitted. The virus can pass from one person to another during vaginal, anal or oral intercourse. It is also spread by contaminated blood or blood products.

  Before 1985, transfusions and factor products used by hemophiliacs were major sources of infection. Today, the U.S. blood supply is safe because all blood is tested for antibodies to the virus before it is used. Organs that are donated for transplantation and semen donated for artificial insemination are also screened for HIV.

  Needles used for injecting drugs or for tattooing or ear piercing can transmit HIV. HIV can also be passed by a pregnant woman to her baby in utero, by exposure to blood during delivery, or after birth through contaminated breast milk.

  The virus is not spread through the air, water or food. It cannot penetrate skin, so there is no danger in touching a person with HIV or sharing eating utensils, bathrooms or other household articles. Mosquitoes, fleas and other biting insects do not transmit the virus. Donating blood is perfectly safe.

  An HIV vaccine may be available in the future. This vaccine may act directly on the virus or indirectly by stimulating increased immune responses. However, an effective vaccine is years away.

  Today, prevention of HIV depends on taking effective precautions regarding sexual practices and needle use, screening blood products, counseling pregnant women, and practicing infection control in public and private health care.

- **Strep throat** is a bacterial infection of the throat. It is transmitted from person to person much like a cold or a flu. It can be cured with antibiotics, but can recur if the

entire prescription of medication is not taken. Left untreated, strep throat can cause more serious illnesses, including rheumatic fever, which can damage the heart.

- **Tuberculosis**, or **TB**, develops slowly and can cause chronic ill health and death if not treated. It is caused by bacteria and usually attacks the lungs, but it can also spread to other parts of the body, especially the bones, kidneys and brain.

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### TB Makes a Comeback

- Tuberculosis was a major cause of death for many centuries.
- TB was one of the first diseases in the United States to produce public health policies, such as "No spitting in the streets," to control its spread.
- Symptoms of TB would prevent immigrants at Ellis Island from entering the country.
- TB has been in decline for more than a century, but the trend is reversing.
- In 1991, more new cases of TB were reported worldwide than at any other time in history: eight million people developed active TB, and 2.9 million people died of it. In the United States, the number of new cases of TB reported annually grew by 16% from 1987 to 1993.
- Factors that contributed to this rise include homelessness, drug use, increasing immigration from countries with high incidence of TB, and overcrowding in prisons, shelters and homes of the poor.
- TB's resurgence is also linked to the spread of HIV. Because HIV weakens a person's immune system, he or she is more likely to develop TB. The spread of these two diseases together may pose the greatest public health threat in modern history.

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TB is highly infectious and is transmitted from person to person through the air. Many states require chest X-rays or skin tests for teachers and others who work with children and youth. The skin test is designed to detect TB-specific cell-mediated immunity.

New strains of TB are resistant to most treatments and drugs. Scientists believe this resistance was enhanced by the over-use of anti-TB drugs and by patients who discontinued treatment before the disease was completely cured.

- **Candidiasis,** often referred to as thrush or yeast infection, is the most common fungal infection in human beings. The fungus *Candida albicans* normally lives on the body's skin surfaces and doesn't cause illness. However, when it invades the membranes of the mouth or vagina, it produces a mild infection.

  One of two conditions is usually responsible for the original outbreak: an individual's natural resistance is low because of another illness, or treatment with antibiotics has upset the natural balance of microbes in the mouth or vagina, which allows the fungus to grow out of control. Once the infection is established, it can be passed to a sexual partner. Maintaining good general health is the best prevention.

- **Ringworm,** or **tinea**, is the name given to a broad range of infections caused by two species of fungal organisms. It is not caused by worms. Tinea infections usually affect the scalp, trunk or feet.

  Specific names are given to the infection depending on its location. *Tinea pedis* is commonly known as *athlete's foot* and *tinea cruris* as *jock itch.*

  Ringworm is spread by direct contact with infected people or animals or contaminated objects (e.g., bedding, combs, towels). The disease can spread as long as the sores are present.

Good hygiene practices, such as bathing, drying thoroughly with clean linens and not sharing towels or washcloths, can reduce the chances of contracting ringworm.

- **Lyme disease** is named after the town of Old Lyme, Connecticut, where it was first reported in 1975. It is caused by a bacterium that is transmitted by ixodid ticks, which live mostly on white-footed field mice and white-tailed deer. The ticks are often very small, and their bite is painless and usually goes unnoticed.

  Lyme disease is hard to diagnose because its symptoms have no predictable time sequence and vary from one person to another and there is no reliable test for the disease. The disease can be avoided by taking precautions to avoid exposure to the ticks when hiking in wooded areas and adjacent grassland.

- **Rocky Mountain spotted fever** is a form of tick-borne typhus that occurs in the Western Hemisphere. It is caused by rickettsia and spread to human beings by a variety of ticks in different parts of the Americas. The disease occurs only during the spring, summer and early fall, when ticks are active.

  Protective clothing, use of tick-repellent chemicals and careful tick removal can substantially reduce the risk. A vaccine that offers moderate protection has been developed but is not yet commercially available.

- **Malaria** is caused by a parasite. It has been eradicated from most counties with temperate climates but continues to be a major problem in tropical and subtropical regions.

  Malaria is transmitted from human to human by the bite of the female *Anopheles* mosquito. Female mosquitoes become infected by taking blood from an infected person. (Male *Anopheles* feed only on plants.)

  The mosquito's saliva becomes filled with malaria parasites, which are injected into the blood when the mosquito

bites the next person. Congenital transmission and transmission by blood transfusion can also occur.

Chloroquinine and several other antimalarial drugs can cure or control the disease. Some strains of the parasite have developed resistance to the usual drugs, but so far other drugs can be successfully substituted. Prevention strategies include eradication of the *Anopheles* mosquito and administering drugs to prevent the onset of the disease to people likely to be exposed to the mosquito bites.

- **Lice** are small insects, or *external parasites*, that live on the scalp or pubic area of infected persons. The nits that can be seen in the hair of the head are the eggs of the louse. The body louse that lives on the surface of the body can be very irritating to the skin and may transmit other diseases, such as typhus. Lice are treated with shampoos and soaps that contain insecticide.

- **Trichinosis** is caused by a tiny worm, a parasite that infects a large number of animal hosts, including pigs, the most common source of human infection. In an infected host, the larval form of the worm lives in muscle tissue, where it becomes encased in fibrous tissue that forms a cyst.

  The worm can live in the cyst for years, but will eventually die unless it is eaten by another animal. If the host animal is eaten, stomach acids dissolve the cyst and release the worm. The worm then pierces the new host's intestine, where it matures, mates and lays eggs, which produce larvae. The larvae spread through the body via the lymph and circulatory systems and eventually find their way into the muscles to begin the cycle again.

  Human beings are generally infected by eating larvae in raw or undercooked pork. Ground beef is sometimes a source of infection, as is meat from wild animals, particularly polar bear, walrus or bush pigs.

Infection has been reduced substantially by public health measures in the meat industry, for example, prohibiting growers from feeding uncooked garbage to hogs. The easiest way to prevent trichinosis is to cook meat, especially pork, to high temperatures.

## 1-Minute Facts

- Infectious diseases are caused by living organisms that spread from one person to another.
- Certain microorganisms, called germs or pathogens, cause disease and illness. Bacteria, viruses, fungi, rickettsia and parasites are the primary pathogens that cause infectious disease.
- The human immune system has five natural mechanisms for fighting infections: species-specific resistance, mechanical barriers to infection, chemical defenses, white blood cells and the inflammatory response.
- The immune response is the body's reaction to specific invading pathogens and the toxins they release. The immune response involves three components: lymphocytes, B-cells and T-cells.
- The development of vaccines and widespread immunization has reduced the incidence of contagious diseases and their destructive effects.
- Vaccines create artificial immunity by stimulating the immune system to produce antibodies that inactivate disease-causing organisms.

# Lifestyle Choices and Chronic Disease

**Myth:** Infectious diseases such as pneumonia are the biggest threats to the health of Americans.

***Fact:*** Chronic deseases related to lifestyle, such as heart disease and cancer, are the leading causes of death in the United States.

Chronic diseases are long-lasting disorders that tend to develop slowly. They can be infectious or noninfectious. Many chronic diseases are related to behaviors. Four of the top five leading causes of death in the United States are chronic diseases related to lifestyle, as indicated in the following chart.

Although biology, heredity and environment also contribute to chronic diseases such as cancer, lung disorders and heart conditions, the most important factor is lifestyle. How people live and how they take care of their bodies play a major role in the most deadly diseases.

**DEATHS DUE TO LIFESTYLE-RELATED DISEASES**

| Cause of Death | Percentage of Total Deaths |
|---|---|
| 1. Heart disease | 34 |
| 2. Cancer | 23 |
| 3. Stroke | 7 |
| 4. Unintentional injury | 4 |
| 5. Chronic obstructive pulmonary disease (emphysema) | 4 |

Source: U.S. National Center for Health Statistics. 1992. *Vital Statistics of the United States,* annual, and unpublished data. As reprinted in *Statistical Abstract of the United States: 1992.* 112th ed. Washington, DC: U.S. Bureau of the Census.

## A Healthy Lifestyle

Key components of a healthy lifestyle include:

- regular exercise
- good nutritional habits
- avoiding tobacco use and exposure to tobacco smoke
- stress management
- abstinence or moderation in alcohol use
- maintenance of a stable, normal weight
- regular use of safety belts
- abstinence or safer-sex practices

■ **Regular exercise:** Many of today's illnesses are clearly related to lack of adequate exercise, for example, high blood pressure (hypertension). Aerobic exercise, any activity that increases heart rate and respiration, is probably the most important health promoter. Aerobic exercise:

- conditions the circulatory and respiratory systems
- helps reduce high blood pressure

- increases the flow of oxygen to all the organs, which improves their efficiency
- promotes a sense of well-being by stimulating the brain to release endorphins
- burns calories
- strengthens the immune system
- reduces stress
- increases stamina and general fitness

Aerobic activities include walking, running, bicycling, swimming, dancing, jumping rope and cross-country skiing. Anything that gets the blood pumping and makes the lungs work harder is aerobic. Even moderate increases in activity level have health benefits.

■ **Good nutrition:** Although not the only factor for shaping health, nutrition is an important one. Exercise and nutrition are two factors that are usually under personal control.

Deficiencies of minerals such as calcium, magnesium and potassium may be linked to hypertension. Too high an intake of sodium may also have hypertensive effects.

Evidence indicates that certain cancers may be linked to diet. Countries in which large amounts of red meat and animal fats are eaten have high rates of colon cancer, while in countries in which people consume mostly fruits, vegetables and grains, this type of cancer is rare.

Cancer of the colon and rectum is very common in the United States. A low-fiber, high-fat diet may contribute to the development of such cancers.

Basic dietary guidelines that promote health and prevent disease include variety and balance.

- **Variety** protects health in two ways. First, eating many different kinds of food provides all the nutrients—vitamins, minerals, proteins, carbohydrates and fats—the body needs for optimal functioning. Second, dietary variety is the best way to avoid overeating foods that could contribute to disease.

- **A balanced diet** refers to the proportion of nutritional components eaten. A balanced diet will be high in complex carbohydrates, low to moderate in protein, and low in fat.

■ **Tobacco use:** The negative health effects of smoking have been exhaustively documented and publicized. Smoking is now considered such a public health risk that it is illegal to smoke in many places, particularly where nonsmokers can be exposed to secondhand smoke.

Yet, in the United States, more than 430,000 deaths a year, 20% of all U.S. deaths, are still attributed to smoking. About a thousand young people a day begin smoking, which increases their risk of premature death from cancer, heart disease and respiratory disease.

Blood pressure goes up temporarily when a person smokes. Although the long-term effect on hypertension is not clear, smoking is a significant risk for heart disease and probably compounds risk for those with high blood pressure.

People who smoke cigarettes are also exposed to numerous compounds known to cause cancer. Smokers are at highest risk for lung cancer, but also risk cancers of the esophagus, mouth, bladder and pancreas. Cigarette smoke enhances the effects of other carcinogens.

Secondhand smoke also poses dangers to nonsmokers. According to the U.S. Department of Health and Human Services, children of parents who smoke have more respiratory illness than children of nonsmoking parents, and secondhand smoke causes disease, including lung cancer, in nonsmokers.

Smokeless tobacco can also cause cancer, particularly oral cancer, as well as other diseases of the mouth and throat. Use of smokeless tobacco can lead to nicotine dependence or addiction.

## What's in Cigarette Smoke?

A lit cigarette releases more than 4,000 known chemical compounds, at least 1,200 of which are poisonous. The following chart lists the three most dangerous of these compounds and their effects.

**Nicotine**

- highly addictive drug
- stimulates, then depresses the nervous system
- increases output of the hormone adrenalin
- increases heartbeat and blood pressure
- constricts blood vessels
- increases oxygen consumption

**Carbon Monoxide**

- interferes with the ability of red blood cells to take up oxygen
- impairs normal nerve function
- contributes to heart attacks and strokes
- can affect vision, hearing and judgment

**Tars**

- cause cancer in the esophagus, lungs, pancreas, kidney and bladder
- help cancer cells grow faster
- form sticky coating on the lungs that impairs respiration
- paralyze and kill cilia cells

- **Stress management:** Stress has many negative effects on health. Stress management techniques can create an important, health-promoting barrier between individuals and stress. Some people can achieve slight, temporary blood pressure reductions through biofeedback, hypnosis or other relaxation methods.

  High levels of stress may be a cofactor in the incidence of heart disease and strokes. Highly stressed individuals are also more likely to be involved in automobile crashes, sports injuries and other events that result in physical harm. Controlled stress may help increase the immune response of the body.

- **Alcohol use:** Alcohol is a drug. It affects the body and mind in various ways, depending on the amount consumed over a period of time. For children and youth, even small amounts of alcohol can be dangerous.

  This drug can be absorbed by and immediately affects all body cells, but probably the most extensive change occurs in the central nervous system. Judgment, memory and perception are progressively impaired as blood alcohol levels rise.

  All types of alcohol raise blood pressure; discontinuing use lowers blood pressure. At high concentrations, alcohol can cause even more serious problems. Because alcohol depresses the central nervous system, heartbeat and respiration can slow. The drinker can lose consciousness.

  At very high blood alcohol levels, coma and death can result from acute alcohol poisoning. Young people who drink large amounts quickly, especially those who participate in drinking contests, are at greatest risk for these types of effects.

  Alcohol is a factor in more than half of all automobile crashes. More than one-third of all suicides also involve alcohol.

Pregnant women who drink risk giving birth to children with *fetal alcohol syndrome*, which includes birth defects such as mental retardation, structural abnormalities of the face and limbs, learning disabilities and heart defects. There is no safe level of alcohol consumption during pregnancy.

- **Weight maintenance:** Surveys show that 90% of Americans think they weigh too much. Even small children worry about their weight. An estimated two-fifths of Americans are on some kind of diet to lose weight. Excessive concern with weight loss can lead to diseases such as *anorexia nervosa* and *bulimia*.

  However, about 60% of people with hypertension are overweight. Obese people are twice as likely to have this disease. Even small weight losses can significantly lower blood pressure.

  A healthy diet combined with regular exercise is the best way to lose weight. Some experts think that some of the diseases linked to obesity may be more related to the common tendency to gain, lose and regain weight than to the excess weight itself. They emphasize the importance of maintaining a stable weight through healthy eating and exercise.

- **Safety belts:** Although not related to disease, routinely wearing safety belts is an important healthy lifestyle behavior. On the average, everyone can expect to be in an automobile crash once every ten years. For one out of every twenty persons, the crash will be serious; for one out of sixty, it will be fatal. Safety belts provide the best protection.

  Passive restraints, such as air bags, do not substitute for the use of safety belts. Such restraints offer protection in head-on or rear-end crashes but are less effective in crashes that occur to the side of an automobile.

- **Abstinence and safer sex:** Abstinence is the best defense against sexually transmitted disease, including hepatitis B and HIV infection. People who are sexually active can limit their risk of exposure by limiting their number of sexual partners and by using latex condoms.

## The Link to Disease

Healthy lifestyle choices can help prevent certain chronic diseases such as heart disease, cancer, stroke and chronic obstructive pulmonary disease. There are different forms of these diseases and many factors that influence them.

### *Heart (Cardiovascular) Disease*

The cardiovascular system includes the heart and blood vessels. When the system is working well, blood flows smoothly to all parts of the body. Anything that interferes with this process is a cardiovascular disease.

Heart disease is the leading cause of death in the United States. Some people are born with structural defects in the cardiovascular system. Other factors that can't be modified include heredity, gender and age. However, lifestyle is one of the most important factors affecting cardiovascular health.

Death from heart disease can be prevented if the disease is detected and treated early. A variety of tests are used to diagnose problems, including:

- cholesterol test
- blood pressure test
- electrocardiogram, which measures the heart's electrical impulses
- arteriogram, also called an angiogram, in which dye is injected into the bloodstream and followed by X-rays that show where arteries are blocked

Diseases identified early are treated first with changes in lifestyle—diet, exercise, smoking cessation, etc. These changes can be used in combination with medication to control specific problems.

The major cardiovascular diseases include:

- arteriosclerosis
- hypertension
- coronary artery disease

■ **Arteriosclerosis:** This disease is also called "hardening of the arteries." It includes several conditions in which debris collects on the arterial walls, causing the arteries to lose their elasticity.

The most common condition is *atherosclerosis*, in which fat streaks or cholesterol appear on the arterial wall, particularly at branch points or where the wall is damaged. As the streaks grow, they further damage the artery. Eventually, a hard mass of fatty tissue called a *plaque* erodes the wall, diminishes the artery's elasticity and narrows the passageway, preventing blood from flowing freely.

■ **Hypertension:** Blood brings oxygen and nutrients to every cell in the body. When the arteries are constricted by plaques, the heart must pump harder to force blood through them. This results in high blood pressure, or hypertension. The extra pressure further damages the blood vessel walls, which causes damage in the heart, brain, kidneys and other organs.

A *sphygmomanometer*, an inflatable cuff connected to a mercury-filled pressure gauge, is used to measure blood pressure. The number of milligrams the mercury rises in the tube is the amount of force blood exerts on the walls of the arteries. Normal adult blood pressure is about 120/80.

The first number is the *systolic* pressure, the greatest force. Higher systolic pressure increases the probability of a sudden event, such as stroke. The second number, the *diastolic* pressure, refers to the lowest amount of force. Higher diastolic pressure increases the probability of chronic heart disease.

## The Cholesterol Connection

Cholesterol, a white, waxy substance found in the bloodstream and all other body tissues, is essential to life. Cells need cholesterol to maintain their outer membranes, and nerve fibers use it as insulation.

The body, chiefly the liver, makes its own daily supply of cholesterol—about 1,000 milligrams. The cholesterol is distributed by the bloodstream in packets called *lipoproteins*. There are two types of these lipoproteins, low density, or LDL, and high density, or HDL.

LDL carries cholesterol to the cells. LDL that is not used continues to circulate in the bloodstream. Eventually, it accumulates in the arterial walls, decreasing the flow of blood. This condition is called *atherosclerosis*.

If LDL blocks the coronary arteries, it can cause heart attack; if it blocks arteries in the brain, stroke is the result. That's why LDL is known as "bad" cholesterol.

HDL carries less cholesterol than LDL. As it circulates, HDL has the ability to pick up cholesterol and bring it back to the liver for processing. Because HDL clears the arterial system, it is called "good" cholesterol.

The average American consumes an additional 400–500 milligrams of cholesterol per day in meats, eggs and dairy products. Cholesterol is found only in animal products.

Blood cholesterol levels are measured by taking a small amount of blood for laboratory analysis. The result is a number between 150 and 300 representing the milligrams of total cholesterol in a deciliter (just under a half cup) of blood.

Levels of 180 or lower are considered optimal. Levels above 200 greatly increase the risk of heart disease. Tests can also evaluate the balance of good cholesterol to bad cholesterol.

Sustained high blood pressure—above 140/90—is called *hypertension*. Left untreated, this disease damages the cardiovascular system. It is called the "silent killer" because most people have no symptoms until the damage has already been done. About one in four Americans have hypertension, and it causes about 30,000 deaths a year in the United States.

- **Coronary artery disease:** When the coronary arteries are blocked, the heart muscle itself is unable to obtain enough blood and oxygen. This causes pain called *angina*.

  When clots completely block blood flow, cells in the heart die, resulting in a heart attack, or *myocardial infarction*. The amount of damage that occurs during a heart attack depends on which arteries are involved. If the blockage is in a major artery, the victim can die.

## *Cancer*

Cancer is the second leading cause of death in the United States. Each year, 1.1 million new cases are diagnosed, and more than 500,000 people die. Only heart disease causes more adult deaths.

Cancer is not a single disease. There are more than 100 types of known human cancers that affect a variety of organs and tissues. Cancer can occur in any person of any age. The most common types of cancer affect the skin, lungs, breast, colon and prostate.

Not all types are equally deadly; about one third of all U.S. cancer patients are cured with medical treatment. Early detection and treatment could help save many more lives.

There are four main types of cancers, named for the kind of tissues in which they are found:

- **Carcinomas** are found in epithelial tissues such as the skin or mucous membranes.
- **Sarcomas** are found in connective tissues such as bone, cartilage, fibrous tissue and muscle.

- **Leukemias** are found in blood-forming tissues, primarily bone marrow and the spleen.
- **Lymphomas** are found in tissues in the lymphatic system.

The disease process begins when something goes wrong with the mechanism that regulates normal cell behavior. Instead of the normal process of cell division necessary to maintain proper body functions, cells begin to follow a disorderly pattern of uncontrolled growth.

As these abnormal cells grow, they form a mass of tissue called a *tumor*. Most tumors are *benign* and do not pose an immediate threat to life, although left untreated they can be dangerous. Some tumors, however, are *malignant*, which means they will invade other tissues. As these tumors spread, or *metastasize*, they destroy normal cells and eventually lead to death.

Scientists do not yet understand precisely why these changes occur. However, they have identified chemicals, radiation, foods and food additives as some of the factors in the process.

### Cancer's Warning Signs

The American Cancer Society has identified seven major warning signs, any one of which can indicate cancer:

1. an unusual bleeding or discharge
2. a lump or thickening in the breast or elsewhere
3. a sore that does not heal
4. a change in bowel or bladder habits
5. persistent hoarseness or a continuing cough
6. indigestion or difficulty in swallowing
7. an obvious change in the appearance of a wart or mole

Other possible signs include rapid weight loss, headaches accompanied by visual or behavioral changes, continuing abdominal pain, prolonged tiredness or excessive bruising.

Viruses may cause some cancers, or abnormal cells may arise through simple, random breakdown of healthy cells. Most abnormal cells are destroyed by the immune system, but in some individuals these cells survive and cancer develops.

The earlier cancer is identified, the better the chance of successful treatment. Treatment options include surgery, radiation therapy, chemotherapy and immunotherapy. But the best way to fight cancer is to maintain a lifestyle that lowers risk.

Some conditions are so frequently associated with the development of cancer that they are considered *predisposing* factors. These factors can be divided into five major risk categories:

- chemical exposure
- radiation
- viruses
- diet
- heredity

■ **Chemical exposure:** Hundreds of chemicals have been shown to cause cancers in laboratory animals, and some have been deemed *carcinogenic*, or cancer-causing, in humans as well. Carcinogens include asbestos and cigarette smoke.

Some food additives have also been found to be carcinogenic, including sodium nitrate, a processed meat preservative and coloring agent. Artificial sweeteners containing cyclamates and saccharin have been linked to bladder cancers.

**LUNG CANCER**

***Lung cancer is the leading cause of cancer death for men and women. More than 85% of people with lung cancer smoked cigarettes.***

- **Radiation:** The link between radiation and skin cancers has been known since the beginning of the twentieth century, when doctors who pioneered the use of X-rays developed carcinomas. All forms of ionizing radiation, including ultraviolet (UV) light, are carcinogenic.

  The major cause of skin cancers is exposure to the sun. Depletion of the ozone layer may be allowing a greater amount of the UV radiation in sunlight to reach the earth, aggravating an already existing problem. Farmers, sailors and sunbathers have the highest incidence of skin cancer, but no one who goes outside is completely safe. Everyone should use skin protection products that block harmful UV light.

### SUNNING BY THE NUMBERS

***The SPF number found on sunscreen products indicates the sun protection factor for each product. Products with a higher number provide more protection than products with a lower number. People with fair skin should use a sunscreen product with an SPF of 15 or higher.***

### Skin Cancer

There are different kinds of skin cancers. The most deadly form is malignant melanoma, which can spread rapidly to other parts of the body. Most skin cancers, however, are non-melanoma types: basal cell carcinoma and squamous cell carcinoma. All three types have a high cure rate if detected early.

The first sign is usually a small, painless change in the skin's appearance. It might be a bump, a wound that just won't heal, or a change in a wart, mole or birthmark. Any change or new growth should be examined by a doctor. Most skin tumors can be safely removed surgically.

- **Viruses:** Several viruses are known or strongly suspected to cause human cancers. Epstein-Barr virus, the cause of infectious mononucleosis, has been implicated in Burkitt's lymphoma and a carcinoma of the nasal cavity.

  Other viruses have also been associated with cancers. High levels of antibodies to herpes simplex II, a very common sexually transmitted disease, have consistently been found in women with cervical cancer. Two other viruses known to be transmitted sexually, *cytomegalovirus* (a form of herpes viruses) and *papillomavirus* (which causes genital warts), are also capable of transforming normal cells. People with hepatitis B, spread both sexually and by contaminated blood, have high rates of liver cancer.

- **Diet:** Increasing evidence indicates that what people eat can have a role in specific cancers. Certain cancers, such as colon cancer, may be linked to dietary practices.

- **Heredity:** Cancer does not seem to be inherited, although there does seem to be a familial predisposition for some types. It is not yet clear, however, whether these tendencies reflect similar lifestyles among family members, for example the same diet, or a genetic factor triggered by the environment.

### A SPECIAL CASE

***There is one clear case of a congenital cancer risk. Women who took the drug DES during pregnancy to prevent miscarriage gave birth to daughters who have high rates of cancer of the reproductive organs.***

### The Importance of Self-Examination

Breast cancer is the second leading cause of female cancer death. Testicular cancer is rare. Although it is responsible for only 1% of all male cancers, it is the most frequent cancer seen in late adolescence and early adulthood.

Early detection and treatment are critical in both these cancers. Testicular cancers detected early have very high cure rates. But because many young men are unaware of this cancer, many cases are found late when they are very serious. Breast cancer also has higher cure rates when detected early.

The first noticeable symptom of breast cancer is a small painless lump or thickening in the breast. Sometimes there is a discharge from the nipple or a change in breast or nipple shape. Usually, only one breast is affected.

Women should check their breasts monthly for any changes. The technique for breast self-examination is easy to learn and takes only minutes to do.

All men should examine their testicles for tumors monthly after a bath or shower. The self-test is easy to learn and quick to do.

## *Strokes*

Strokes are the third leading cause of adult death in the United States. Also known as *cerebrovascular accidents*, strokes are like heart attacks in the brain. Cerebrovascular diseases, including strokes, disable approximately half a million Americans a year.

Strokes occur when the supply of blood, and the oxygen it carries, is interrupted, causing brain cells to die. Strokes can be mild or so severe that debilitation or death results.

There are three main causes of stroke:

- **Cerebral thrombosis** occurs when a blood clot forms in a blood vessel leading to the brain.
- **Cerebral embolism** occurs when material from another part of the body, typically a blood clot, is carried to the brain and blocks the artery.
- **Cerebral hemorrhage** occurs when a blood vessel ruptures in the brain.

Lifestyle factors can increase the risk of stroke. Risk factors include:

- atherosclerosis, hypertension, irregular heartbeat, diabetes, kidney disorders, or a recent heart attack
- smoking
- obesity
- use of oral contraceptives combined with any of the other factors

A healthy lifestyle, which includes getting regular blood pressure checkups, not smoking, eating a diet low in fats and exercising regularly, decreases the risk of stroke.

### *Chronic Obstructive Pulmonary Disease*

Chronic obstructive pulmonary disease, often called *emphysema*, is the fifth leading cause of death in the United States. As this disease of the lungs progresses, the lungs become less and less efficient because the *alveoli*, air sacs that exchange carbon dioxide for oxygen, no longer function.

This loss of function leads to shortness of breath that gets worse over time. Eventually, emphysema leads to respiratory or heart failure.

Smoking is the number one risk factor for emphysema. More men than women get the disease, although rates for women increased as more women began to smoke. People with other lung diseases, including chronic bronchitis or asthma, also have higher rates of this disease. The best protection against emphysema is the avoidance of tobacco smoke.

# 1-Minute Facts

- Chronic diseases are long-lasting disorders that tend to develop slowly.
- Chronic diseases can be infectious or noninfectious.
- Four of the top five leading causes of death in the United States are chronic diseases related to lifestyle.
- The key components of a healthy lifestyle include regular exercise; good nutritional habits; avoiding tobacco use and exposure to tobacco smoke; stress management; abstinence or moderation in alcohol use; maintenance of a stable, normal weight; regular use of safety belts; and abstinence or safer-sex practices.
- Healthy lifestyle choices can help prevent chronic diseases such as heart disease, cancer, strokes and emphysema.

# Other Noninfectious Diseases

**Myth:** People with epilepsy are retarded.

***Fact:*** Epilepsy is a brain disease that causes the neurons to discharge suddenly and cause a seizure. Epilepsy does not interfere with a person's ability to think, to grow or to develop his or her intellectual, creative or physical talents. Epilepsy is not a form of mental retardation.

Some chronic noninfectious diseases are related less to lifestyle than to other factors, such as environment and heredity. Many of these diseases have no cure, but treatment can ease symptoms and prolong life.

## Heredity

Diseases with a direct hereditary link include:

- cystic fibrosis
- Down syndrome
- hemophilia

- muscular dystrophy
- sickle cell anemia
- Tay-Sachs disease

Diabetes may also be linked to heredity.

- **Cystic fibrosis**, or **CF**, is an inherited disease that affects the lungs and pancreas. People with CF have trouble breathing because a thick mucus coats the bronchial tubes in the lungs. Germs become trapped and grow in the mucus, causing respiratory infections.

  This disease affects approximately one in 20,000 White children; it is very rare among people of other ethnicity. With proper medical attention, people with CF usually survive into their twenties and thirties.

  CF is caused by a defective recessive gene. A child's mother and father must both have the gene. Children of carrier parents have a 25% chance of getting the disease, a 50% chance of being carriers and a 25% chance of being free of both the disease and the gene.

- **Down syndrome** is an inherited disease caused by the presence of an extra chromosome. Most people have 46 chromosomes arranged in 23 pairs. People with Down syndrome have 47 chromosomes, with three copies of chromosome number 21. The extra chromosome causes mental retardation in people with this syndrome.

- **Hemophilia** is an inherited disease that keeps the blood from clotting. It can lead to severe bleeding. The defective gene that causes hemophilia is passed from mother to son, although a man who has the disease can also pass it to his daughters, who become carriers.

  Hemophilia can be treated with injections of Factor VII, a blood product that contains the missing protein. HIV, the virus that causes AIDS, was passed to many hemophiliacs in infected batches of Factor VII, but new blood screening techniques have reduced this risk.

- **Muscular dystrophy** is a rare group of inherited diseases that slowly destroy muscle tissue. It causes muscle weakness and wasting. The most common type affects only males. It is caused by a recessive gene passed on by the mother.

- **Sickle cell anemia** is an inherited blood disease that occurs primarily in African Americans and, less commonly, in people of Mediterranean origin. The red blood cells of victims contain an abnormal type of hemoglobin (oxygen-carrying pigment) called *hemoglobin S*.

  Like CF, sickle cell anemia is caused by a defective recessive gene. Both parents must be carriers of hemoglobin S to have a child with the disease. However, the *sickle cell trait* may be passed to a child from only one parent. A person with only the trait usually has no symptoms.

- **Tay-Sachs disease** is an inherited disorder that occurs primarily in Eastern European (Ashkenazi) Jews. Both parents must be carriers of the recessive gene in order to produce children with the disease. Children with this disease have little or none of an important enzyme. This lack leads to mental retardation, paralysis and blindness. Children with the disease usually die before age four.

- **Diabetes** may be linked to heredity. More than 10 million Americans have been diagnosed with *diabetes mellitus*, and an estimated 5 million more have the disease but don't know it. Diabetics are unable to make sufficient supplies of *insulin*, the pancreatic hormone that maintains blood glucose levels, helps muscles use glucose for energy and helps the muscles and liver store glucose.

  Reduced levels of blood insulin cause glucose to build up in the blood, leading to a condition known as *hyperglycemia*. High sugar levels can damage arteries, cause blindness and contribute to kidney failure.

There are two types of diabetes:

- In **insulin-independent diabetes**, the pancreas does produce insulin, but not enough to meet the body's requirements. The person's body is resistant to insulin; thus, greater amounts are required to maintain normal functions. People with this disorder tend to be overweight and usually overeat, which contributes to excess glucose in their blood. Insulin-independent diabetes usually affects people over age 40.
- In **insulin-dependent diabetes**, the pancreas makes very little or no insulin because of a defect in the insulin-producing cells. Also called *juvenile-onset diabetes*, insulin-dependent diabetes occurs mainly in young people. It is more serious but less common than insulin-independent diabetes.

The cause of diabetes is not known, but both types may be hereditary. People who have a family history of diabetes and/or are obese have the greatest risk. Insulin-dependent diabetes is also thought to be a disorder of the immune system.

A combination of diet and insulin supplements can help diabetics lead normal lives. A diet plan that controls weight and provides a regular eating schedule can control blood glucose levels.

Diabetics must limit their intake of alcohol and get regular exercise. Diet and exercise may be enough to control the disease in some people who have the insulin-independent form. Others may require oral forms of insulin.

There is no prevention for insulin-dependent diabetes. People with this form of diabetes must take insulin and modify their exercise and eating patterns.

## Environment

The environment can be a factor in many diseases, including cancer. Air pollution can contribute to respiratory problems. Asthma, the leading cause of chronic illness in children, has both a hereditary and an environmental link.

■ **Asthma** is a chronic disease of the lungs' air passages. Also known as *bronchial asthma* or *airway obstruction disease*, it affects more than 10 million Americans. Although understanding of the disease and its treatments has improved, the rates of illness and death related to asthma continue to rise.

Asthma symptoms are caused by muscular spasms in the large airway passages, or *bronchi*, in the lungs. These spasms lead to wheezing, difficulty in breathing, tightness in the chest and a dry cough.

Many physical and chemical agents can set off asthma attacks, including:

- allergens such as pollen, foods or animal dander
- environmental irritants such as automobile emissions and cigarette smoke
- respiratory infections
- cold air
- occupational exposure to chemical irritants
- exercise

Asthma is a leading cause of illness and death in inner-city minority children. However, therapy has improved significantly in recent years. If the disease is properly managed, people with the disease can lead normal lives with minimal discomfort.

Avoiding allergens and irritants can reduce symptoms and the need for medication. Allergy tests can help determine which specific substances trigger attacks, and an allergist may offer desensitizing immunizations. Wearing a

scarf or mask can prevent problems caused by cold air. Certain sports that involve lots of running may be a problem. However, medications that can prevent serious attacks can be taken about an hour before exercise.

**THE NEED FOR INHALERS**

***Children and youth with asthma need to have their inhalers containing medications used to relieve the symptoms of an attack with them at school. Schools should avoid enacting policies that prohibit students from carrying medications, such as requiring students to leave their inhalers with the school nurse or secretary.***

## Autoimmune Diseases

In autoimmune diseases, the body attacks its own cells and tissues as though they were foreign objects. Some diseases are clearly associated with the autoimmune response. Several diseases are thought to be autoimmune diseases, although the evidence is not definite. These include:

- multiple sclerosis
- rheumatoid arthritis
- systemic lupus erythematosus

■ **Multiple sclerosis**, or **MS**, is a chronic, degenerative disease of the nervous system. It affects the myelin sheaths covering nerve cells. In healthy people, the myelin supplies nutrients to the nerves and helps conduct electrical impulses. In people with MS, the myelin becomes inflamed and swollen, and eventually breaks down.

The disease usually begins between the ages of 20 and 40 and affects women slightly more often than men. Many researchers believe it is an autoimmune disorder in which the immune system for some reason attacks the myelin. Some evidence suggests that the immune response may be triggered by a virus.

Because the nervous system is so extensive and myelin is so widespread, MS can show up in many different ways. Most commonly it begins with a vague symptom, such as weakness or numbness in a limb, which clears up completely in a few days. More severe symptoms include blurred vision, slurred speech or general loss of balance. Even these symptoms may disappear without further problems.

For some people, however, there are repeated attacks. Recovery is less complete, and permanent disability with progressive weakness or loss of vision develops.

- **Rheumatoid arthritis,** perhaps the most serious form of arthritis, is the most common form found in children. It is characterized by inflammation of and pain in any or all parts of the body. Although its cause is unknown, researchers suspect that it may be caused by a breakdown of the immune system.

  *Osteoarthritis* is common as people age. It is characterized by joint and back stiffness, which is usually at its worst upon rising in the morning. It is not considered an autoimmune disease.

- **Systemic lupus erythematosus**, or **SLE**, sometimes called "lupus," is an autoimmune disorder that affects the body's connective tissue. It usually appears first in young adulthood and affects nine times as many women as men.

  A more common but less severe form of the disease is called *discoid lupus erythematosus*. It attacks only the skin, and attacks may be triggered by exposure to sunlight, stress and infections.

## Diseases with Unknown Causes

The cause of some chronic diseases is still unknown. Some, such as epilepsy and cerebral palsy, may be related to brain damage before, during or after birth.

- **Cerebral palsy** refers to a group of physical disorders caused by brain damage before, during or shortly after birth, or during early childhood. It may be caused by infections or malnutrition in the mother during pregnancy, premature birth, injuries during birth, or head injuries or infections after birth.

  Cerebral palsy may affect as many as six out of every thousand children. Its effects range from mild problems with muscle coordination to severe paralysis.

- **Epilepsy,** or seizure disorder, has many forms, each with its own symptoms. All are caused by a problem in the way nerve cells in the brain communicate with each other.

  The majority of cases of epilepsy have no known cause. Two-thirds of people with this disorder have no structural abnormalities in their brains or history of injury or disease.

  The remaining cases can usually be traced to an underlying problem such as brain damage at birth, severe head injury, brain tissue infections, and, occasionally, brain tumors. There is some evidence that epilepsy runs in some families.

  Symptoms can range from momentary lack of awareness to severe convulsions. The exact symptoms are determined by how much of the brain is involved.

  Mild seizures, once called *petit mal seizures*, are now called *absences* or *generalized nonconvulsive seizures*. They are most common in children. A child may stare into space or stop an activity and blink his or her eyes excessively for a few moments. There is no memory of the experience. These seizures may occur rarely or dozens of times throughout the day.

Severe seizures are known as *generalized convulsive seizures* or *grand mal seizures*. The person loses consciousness and falls to the ground. His or her body stiffens and jerks uncontrollably. Sometimes bladder or bowel control is lost. The seizure may last for several minutes and be followed by confusion or a period of deep sleep.

### AVOIDING INJURY DURING SEIZURES

***Because of the possibility of injury during grand mal seizures, all potentially harmful objects, such as desks, sports equipment and knives, should be moved out of the way when someone has a seizure.***

## 1-Minute Facts

- Some chronic noninfectious diseases are related less to lifestyle than to other factors, such as environment and heredity.
- Diseases with a direct hereditary link include cystic fibrosis, muscular dystrophy, hemophilia, sickle cell anemia and Tay-Sachs disease.
- Environmental hazards, especially air pollution, can be a factor in many diseases, such as asthma.
- Autoimmune diseases, such as rheumatoid arthritis, cause the body to attack its own cells and tissues as though they were foreign objects.
- Some chronic diseases may be related to brain damage before, during or after birth.

# Mental Illness

**Myth:** People with schizophrenia have a "split" personality.

***Fact:*** Schizophrenia is a severe mental disorder characterized by unpredictable disturbances in thinking, mood, awareness and behavior. However, schizophrenics do not have "split" or multiple personalities. Multiple personality disorder is a different disorder.

Many experts now differentiate between mental illness and mental health. All people are faced with challenges just living day to day. They are usually able to adapt physically and psychologically to meet these demands. When life's demands exceed a person's coping resources, interfering with emotional well-being or efforts to reach personal goals, his or her mental health may be affected.

Mental illnesses are diseases that affect the brain. Mental illnesses often have a biological base just as physical illnesses do. They may be related to factors such as too much or too little of natural brain chemicals, structural brain abnormalities, or changes induced by drugs and environmental poisons.

These factors, many of which are probably inherited, make some people vulnerable to mental illnesses.

Like most physical diseases, mental illnesses are understandable, with a predictable pattern of symptoms. Many mental illnesses can be successfully treated. They are often treated with *psychotherapy*, communication between a trained counselor and the patient, and medication.

The symptoms of mental illness are caused by malfunctions in the brain. The major cause of mental illness appears to be a breakdown in neurotransmitter systems in the brain due to chemical imbalances.

Mental illness is different than mental retardation. Mental retardation is actually a group of disorders referred to as developmental disabilities. The syndromes of mental retardation can range from mildly to severely impaired cognitive and intellectual ability. Intelligence tests are used to determine mental retardation. Common causes of mental retardation include:

- Down syndrome
- severe early head trauma
- anoxia (lack of oxygen) during birth

Mental illnesses affect men and women of all ages, ethnic groups, income and educational levels. The cost of mental illness, for both the person and for society, is very high, comparable to major physical illnesses such as heart disease and cancer.

**A PARENT'S THOUGHT**

***"It would be easier if my child had cancer. There might be more sympathy."***
***—Anonymous member of the National Alliance for the Mentally Ill***

However, American society tends not to regard mental illness as a disease, as it does physical illness. This stigma is reinforced by policies regarding health insurance. Many insurance companies do not provide coverage for mental illness, which prevents people with these diseases from receiving treatment.

Mental illness is no more shameful than cancer or injury. Mental illnesses are real, legitimate illnesses, but until people become educated about them, factual inaccuracies and harmful prejudices will persist.

**THE STIGMA OF MENTAL ILLNESS**

***Many people still believe that individuals with mental illness are of weak character and could do something to change if they really wanted to. This stigma is a serious problem in society's response to mental illness.***

## Types of Mental Illness

There are four general categories of mental illness:

- schizophrenia
- mood disorders
- borderline personality disorder
- anxiety disorders

### *Schizophrenia*

Schizophrenia is a chronic disorder that involves a group of brain diseases. It is associated with structural and functional brain differences. It is a form of *psychosis*, a disorder that results in loss of contact with reality and major personality disruptions. However, people with schizophrenia do not have multiple personalities and identities.

Schizophrenia may begin early in life. It affects approximately 1% of the population worldwide. The most severe form of the disease appears during adolescence. Adult-onset schizophrenia develops in the twenties and thirties.

Schizophrenia may have both genetic and environmental links. People with a close relative who has the disease have a five to ten times greater risk for developing it. If both parents have schizophrenia, their children's risk is even higher.

Schizophrenia has a wide variety of symptoms. No single patient is likely to display all symptoms of the illness or even the same symptoms over time.

As in other mental illnesses, faulty brain chemistry may be involved in schizophrenia. Many researchers believe too much *dopamine*, a neurotransmitter, is present in the brain. Animal studies suggest excess dopamine can cause many of the symptoms, including hallucinations and delusions. Cocaine and amphetamines also stimulate dopamine production, and use of these drugs can produce a psychosis very similar to schizophrenia.

Until recently, people with schizophrenia almost always required hospitalization. Due to significantly improved treatments, this is no longer true. Approximately one third of people with schizophrenia recover (technically defined as staying symptom-free for five years), 60% continue to have varying degrees of episodic psychosis, and only 10% have classic deterioration and permanent disability.

Medication is the first line of treatment. A number of antipsychotic drugs can be used to manage symptoms. However, some people cannot tolerate the drugs; others do not respond to the medications.

Social support is critical. Many patients can live in the community with minimal help. Assisted-living situations such as group homes or residential care facilities are good options. These facilities provide patients with a structure that relieves stress and increases compliance with medications.

## Mood Disorders

All people experience moods. Even bad moods are normal. People who fail to react to loss or good fortune would not seem normal. Mood governs motivation, energy, emotional experience and attitude.

However, some people experience moods that are extreme, persistent and inappropriate. These mood disorders are disruptions of normal emotional regulation at either the high or low end.

Mood disorders are the most common psychiatric disorders. The two major categories of mood disorders are depressive disorders and bipolar, or manic-depressive, disorders. Mood disorders are caused by chemical imbalances in the brain.

- **Depression** is one of the most common mood disorders. Approximately 10% of the population will experience at least one episode of severe depression. Women are twice as likely as men to become depressed.

  Children with one depressed parent are two or three times more likely than other children to experience depression. If both parents are depressed, the risk doubles. Although depression occurs among people of every age, rates peak among those ages 25 through 44.

  Depression is usually diagnosed by assessing typical symptoms and their pattern. Individual and family histories of the disease are also considered. Written psychological inventories, or tests, are given to assess symptoms.

  Current research is focused on biological tests to diagnose depression. Doctors may soon have new ways to identify abnormal brain and body functions associated with the different forms of this disease.

  Depression is one of the most treatable mental illnesses. In some cases it can be completely cured, and in other cases, the episodes of depression can be managed and severity reduced. Treatment programs may include antidepressant drugs, psychotherapy or electroconvulsive (shock) therapy.

### Symptoms of Depression

Symptom patterns of depression include a wide range of signs that pervade all areas of life, including:

- mild to severe low mood with feelings of unhappiness, hopelessness, gloom and despair
- loss of the ability to experience pleasure, interest or satisfaction in usual activities
- low self-esteem with feelings of worthlessness and guilt
- impaired intellectual functions, including inability to concentrate or make decisions, disorientation and memory lapses
- physical and emotional withdrawal from other people
- physical problems such as insomnia, appetite disturbances, loss of sexual desire, low energy, fatigue, gastrointestinal upsets, headaches, and bodily aches and pains

■ **Bipolar** or **manic-depressive disorders** are another type of mood disorder. Some people who experience depression also have periods of high mood called *mania*. Mania is an extreme state of euphoria, excitement, enthusiasm and overconfidence. People in this phase can be highly impulsive.

This illness is termed *bipolar* because people bounce back and forth between extremes of depression and mania. The illness can appear suddenly and episodes can last for weeks or months.

The mania is usually shorter than the depression phase. Without treatment, the symptoms become more severe. Some people go directly from one phase to the other, while some experience normal moods in between. A small percentage constantly have one of the impaired moods.

Bipolar illness affects men and women equally. It often strikes in the late teen years or early twenties. About 60% of people with the disease have a family history of mood disorders.

The depression phase of bipolar illness has the same symptoms as depression. Mania is characterized by an inflated, grandiose sense of self. People in this phase act like "maniacs." They talk constantly, throw themselves into activities, never get tired and have no desire to sleep. They also lose normal restraint and the ability to judge consequences for their actions. Some experience paranoia, delusions or hallucinations.

Bipolar illness is treated with the drug lithium. For people in the manic phase, lithium restores normal sleep patterns and eliminates most manic symptoms. The drug is also used for maintenance to prevent or reduce the severity of future attacks of mania and depression. Psychotherapy can help individuals and their families learn about this illness and develop skills to deal with it.

### Depression and Suicide

Suicide is one of the leading causes of death among teenagers, and rates are on the rise. Warning signs for suicide risk include:

- all the symptoms of severe depression
- threats of suicide or statements indicating a desire for death
- a previous suicide attempt after which no counseling was received
- personality or behavioral changes, including a sudden change from depressed to happy
- giving away personal belongings
- excessive use of alcohol or other drugs
- risk-taking or life-threatening behaviors
- truancy or running away from home
- preoccupation with aspects of death or the impact of death on others
- self-deprecating remarks
- neglect of personal appearance

### *Borderline Personality Disorder*

This disorder was once closely linked with schizophrenia, but scientists now believe that there is a cluster of symptoms that differentiates this disorder from other mental illnesses. People with this disorder feel chronically bored and empty. In their desperate search for stimulation, they may gamble, use drugs, become sexually preoccupied or attempt suicide.

The disorder tends to run in families. It is usually treated with long-term psychotherapy and sometimes with medication.

### *Anxiety Disorders*

Everyone becomes anxious when faced with unexpected, unusual or highly stressful situations. Anxiety, and the physiological responses it triggers in the human body, is a normal adaptive response signaling the need for action.

In anxiety disorders, however, anxiety is triggered by everyday problems. Fearfulness and anxiety are persistent and disabling. Anxiety disorders are often associated with other forms of physical and mental illness.

Mental symptoms of anxiety include dread, apprehension, fear, terror, uncertainty, nervousness, irritability, inability to concentrate and feelings of unreality. Physical symptoms can be extensive and may include pounding heart, difficulty in breathing, dizziness, fainting, chest pain, stomach cramps, nausea, constipation, diarrhea, chills, insomnia, sweating and dry mouth.

**ADOLESCENT ANXIETY**

***Anxiety is a normal part of adolescence. Psychologists often need to make adjustments in testing for mental disorders, including anxiety disorders, in teenagers due to the predictable developmental aspects of adolescence. When teenagers are educated about mental illness, including anxiety disorders, educators may need to help them avoid personalizing the information.***

All symptoms can range from mild to severe. Some people become so anxious they think they're having heart attacks. When anxiety is so severe that it affects a person's ability to function and reasonably enjoy life, it falls into one of the categories of anxiety disorder.

Anxiety disorders can be successfully treated with medications, behavioral therapy, such as relaxation techniques, and psychotherapy aimed at resolving underlying conflicts. Often a combination of these treatments works best.

Different types of anxiety disorders have their own characteristics, causes and treatments, but scientists believe that they have their origin in the chemistry of the brain. There is some evidence that a tendency for anxiety disorders may be inherited. The three main groups of anxiety disorders are

- phobias
- anxiety states
- post-traumatic stress disorder

■ **Phobias** are persistent, irrational fears of specific objects, activities or situations that result in a desire to avoid whatever is feared. Most people experience at least one phobia, such as fear of snakes, fear of public speaking or fear of closed places.

Common phobias include *claustrophobia*, a fear of closed spaces, and *acrophobia*, a fear of heights. *Agoraphobia*, a fear of public spaces, may be the most common and most crippling of these disorders. People with this disorder may severely limit their activities to avoid going into public places.

- **Anxiety states** involve fears that are more generalized than phobias. They include:
  - **Panic disorder:** sudden attacks of terror with physical symptoms including chest pains, increased heart rate and difficulty breathing.
  - **Generalized anxiety:** a constant state of tension with no obvious cause.
  - **Obsessive-compulsive disorder:** involves the presence of unwanted thoughts and senseless repetitive acts, such as handwashing.

- **Post-traumatic stress disorder** gained attention after the Vietnam War. It involves reaction to a traumatic event, such as combat, earthquakes or other major disasters. Symptoms may include sleep problems and loss of interest in activities.

## Help for People with Mental Illness

Mental health professionals are trained to help people in different situations. Each practitioner can provide mental health services, but the training and approach to therapy will vary. Professionals from different disciplines often form a treatment team.

Certain legal restrictions apply to practitioners' roles. For example, only psychiatrists may prescribe medication. Licensing requirements vary from state to state, although national organizations within each discipline issue certifications to ensure that therapists have had specific training and professional experience.

- **Psychiatrists** are medical doctors who specialize in the diagnosis and treatment of mental disorders. They have completed medical school, a one-year internship and three-year psychiatric residency. Most psychiatrists are also certified by the American Board of Psychiatry and Neurology. All must be licensed by the state in which they practice.

  Psychiatrists can evaluate the extent of organic illness and prescribe medications or admit patients to a hospital. They also usually practice some techniques of psychotherapy.

- **Clinical psychologists** focus on personality and behavior to understand a person's emotional problems. They have earned a doctorate in clinical psychology or a doctor of psychology degree. They have completed intensive coursework and clinical training. All states require licensing, and most psychologists belong to the American Psychological Association.

  Clinical psychologists provide psychotherapy and administer and interpret psychological tests.

- **Clinical or psychiatric social workers** are social workers who specialize in treating people with mental disorders. Most have master's degrees in social work. All states have licensing, certification or registration requirements for social workers, but the specific regulations vary from state to state.

  Psychiatric social workers can provide psychotherapy for all mental and emotional difficulties.

- **Psychiatric nurses** hold master's degrees and have completed specialized training in mental health through coursework and hospital experience. They are certified by the American Nurses' Association.

  Psychiatric nurses are knowledgeable about physical conditions that relate to mental disorders and the action and side effects of medications used in treatment. They can also provide individual, group and family psychotherapy. They can work in private practice or in hospitals.

- **Mental health counselors** provide a wide range of therapeutic services. Some provide excellent help and are extremely professional. However, it is important to verify their qualifications. There is usually no legal licensing requirement, and, in most states, anyone can legally call himself or herself a "counselor," whether trained or not.

  However, a professional degree in mental health counseling is available. The master's level program requires two years of courses and clinical work. Graduates are certified by the National Academy of Certified Clinical Mental Health Counselors Association. Counselors with this certification are qualified to practice psychotherapy.

- **Marriage and family counselors** receive specialized training in family therapy from a family therapy institute. Sixteen states regulate, license or certify family counselors, but there is no national certification program. Often, licensed psychologists, psychiatrists, social workers or nurses will specialize in marriage or family counseling.

# 1-Minute Facts

- Mental illnesses are diseases that affect the brain. Just like physical illnesses, they have a biological base and are usually understandable, with a predictable pattern of symptoms.

- American society tends not to treat mental illness as a legitimate disease, which prevents mentally ill people from receiving the attention and treatment they need.

- The four general categories of mental illness are schizophrenia, mood disorders, borderline personality disorder and anxiety disorders.

- The approaches to therapy and treatment of people with mental illness will vary according to the training and licensing of each mental health professional.

# Glossary

## A

**acetaminophen**—An analgesic that relieves pain and lowers fever but does not reduce inflammation.

**alveoli**—The air sacs at the end of the airway in the lungs, responsible for carbon dioxide-oxygen exchange.

**analgesic**—A drug that relieves pain.

**antibiotic**—A drug usually derived from molds and fungi, which is used mainly to treat bacterial infection.

**antibody**—A protein produced by the body's white blood cells to neutralize or destroy invading foreign chemical substances (antigens).

**antigen**—A foreign chemical substance that causes the immune system to react when it enters the body.

**atherosclerosis**—A disease in which the arteries become clogged with fats and other substances that form plaques.

## B

**bacteria**—One-celled, microscopic organisms found in living things, air, soil and water. Some are beneficial to humans, but some cause disease.

**B-cells**—Lymphocytes that develop in the bone marrow and protect against disease and infection.

**benign**—Nonmalignant; not immediately life-threatening.

**bronchi**—The large air passages in the lungs.

## C

**carcinoma**—A malignant cancer of the tissue surfaces such as skin, linings of the internal organs, and glands; the most common type of cancer.

**carcinogenic**—Capable of causing cancer.

**chemotherapy**—The treatment of disease by use of drugs.

**cholesterol**—A fatty substance found in animal products and manufactured by the body. High amounts are associated with cardiovascular disease.

**chronic**—Refers to diseases that start slowly and develop over a period of years.

**cilia**—Tiny hair-like projections that line certain parts of the body, such as the respiratory tract. Their constant motion helps sweep away foreign particles and prevent pathogens from entering the body.

**communicable**—Refers to a disease that is spread from one person to another either directly or indirectly.

**contagious**—Refers to a time period when an infected person is able to pass an infectious disease to another person by direct or indirect contact.

**cyanosis**—Blueness of the skin caused by lack of oxygen in the blood.

## D

**delusion**—False belief to which a person clings despite proof that it is false.

**diastolic**—The lowest arterial blood pressure measured between heartbeats.

**disease**—A particular destructive process in an organ or organism, with a specific cause and characteristic symptoms.

## E

**edema**—The condition resulting from collection of fluid in connective tissue.

**endemic**—A disease that is restricted to and constantly present in a population or geographical area.

**endorphins**—Natural pain-relieving chemicals released by the brain.

**epidemic**—A disease that exceeds the expected number of cases of the disease.

**epidemiology**—The study of the distribution of diseases in a population and the factors that influence the occurrence of disease.

## H

**health promotion**—Activities geared toward enhancing the quality of life and preventing disease and disability.

**high-density lipoprotein (HDL)**—A type of lipoprotein that carries cholesterol from the bloodstream to the liver, where it can be processed. HDL may protect individuals against coronary artery disease.

**HIV**—Human immunodeficiency virus; the virus that causes AIDS.

**hypertension**—Chronic abnormally high blood pressure.

## I

**immunity**—The state of being able to resist a particular disease by counteracting the potential effects of a foreign substance or pathogen.

**immunoglobulins**—Protein substances in the blood serum.

**incubation**—The time span between exposure to a disease organism and the onset of symptoms.

**infectious**—Refers to a disease spread by pathogens.

**inflammation**—A response of the body to infection or injury characterized by redness, swelling, fever and pain.

**interferons**—A family of proteins produced in response to infection with a virus. They protect neighboring host cells from infection.

## L

**leukemia**—Cancer of the blood-forming tissues of the body, characterized by the production of abnormal white blood cells.

**lipoprotein**—A molecule composed of lipids and proteins that carries fats and cholesterol through the bloodstream.

**low-density lipoprotein (LDL)**—A type of lipoprotein that carries cholesterol from the digestive tract to other body tissues; implicated in the accumulation of plaque within arteries.

**lymphocyte**—A white blood cell that circulates in blood and lymph fluid.

**lymphoma**—Cancer of the lymph system.

## M

**malignant**—Cancerous and of life-threatening potential.

**metastasis**—A term usually applied to a malignant growth that develops in one part of the body as a result of the spread of abnormal cells from another part of the body, or to the process by which this spread occurs.

**mutate**—Change in normal structure or function.
**myocardial infarction**—Heart attack.

## N

**noncommunicable**—Not spread from person to person.

## O

**obesity**—A condition in which an abnormal proportion of body tissue is fat.

## P

**pandemic**—A disease outbreak that has spread over a large geographic area.
**pathogen**—A microorganism that can cause disease, e.g., bacterium, virus, fungus.
**phagocyte**—A cell that can ingest and destroy foreign materials within the body.
**protoplasm**—A clear, semifluid substance that contains the essential living matter in all animal and plant cells.
**protozoan**—A microscopic animal that is made up of a single cell or a group of identical cells and lives chiefly in water or as a parasite.
**psychosis**—A mental illness in which contact with reality is severely impaired by such symptoms as delusions, hallucinations and bizarre behaviors.

## R

**radiation therapy**—The X-ray treatment of tumors, especially those of a cancerous nature, to reduce their size and potential destructiveness.
**reservoir**—An environment conducive to the maintenance of pathogens.

**risk**—The likelihood of injury, damage or other negative consequences following an action.

## S

**sarcoma**—Cancer of the connective tissues such as bones, cartilage or muscles.

**scientific method**—Research in which a hypothesis, formulated after systematic, objective collection of data, is tested by controlled experiments.

**sphygmomanometer**—A device consisting of an inflatable arm cuff and mercury-filled pressure gauge that measures blood pressure.

**systemic**—Affecting the entire organism or bodily system.

**systolic**—The highest arterial blood pressure measured just after the heart beats.

## T

**toxin**—A poisonous compound that causes disease.

**tumor**—An accumulation of abnormal or cancerous cells.

## V

**vaccine**—A preparation containing killed or weakened viruses or bacteria; administered to impart immunity to a specific disease organism or toxin.

**virion**—A particle composed of a single strand of genetic material in a protein shell. It is the smallest unit of a mature virus.

**virus**—An organism formed of genes surrounded by a protein coating; technically, not a living organism since it cannot reproduce itself but must invade a living cell to replicate.

# Resources

AIDS Action Council
1875 Connecticut Ave., Suite 700
Washington, DC 20009
202-986-1300

Alzheimer's Association
919 North Michigan Ave.
Chicago, IL 60611
800-272-3900

Alzheimer's Disease Education and Referral Center
P.O. Box 8250
Silver Spring, MD 20907
301-495-3311

American Alliance for Health, Physical Education, Recreation and Dance
1900 Association Dr.
Reston, VA 22091
703-476-3400

American Association of Sex Educators, Counselors and Therapists
435 N. Michigan Ave., Suite 1717
Chicago, IL 60611
312-644-0828

American Cancer Society National Office
1599 Clifton Rd. NE
Atlanta, GA 30329
800-255-2352
Response System: 800-ACS-2345

American Diabetes Association
1660 Duke St.
Alexandria, VA 22314
800-ADA-DISC

American Foundation for AIDS Research
5900 Wilshire Blvd., 23rd Floor
Los Angeles, CA 90036
213-857-5900

American Heart Association
7272 Greenville Ave.
Dallas, TX 75231
800-242-1793

American Kidney Fund
6110 Executive Blvd., Suite 1010
Rockville, MD 20852
800-638-8299

American Lung Association
1740 Broadway
New York, NY 10019
212-315-8700

American Medical Association
Department of Health Education
515 N. State St.
Chicago, IL 60610
312-464-5000
Customer service: 800-621-8335

American Pharmaceutical Association
2215 Constitution Ave. NW
Washington, DC 20037
202-628-4410

American Psychiatric Association
1400 K St. NW
Washington, DC 20005
202-682-6000

American Psychological Association
750 First St. NE
Washington, DC 20002
202-336-5500

American Public Health Association
1015 15th St. NW
Washington, DC 20005
202-789-5600

American Red Cross
National Headquarters
18th & D Sts. NW
Washington, DC 20006
202-737-8300

American School Health Association
P.O. Box 708
Kent, OH 44240
216-678-1601

Arthritis Foundation National Office
1314 Spring St. NW
Atlanta, GA 30309
Information Line: 800-283-7800

Asthma and Allergy Foundation of America
1125 15th St. NW, Suite 502
Washington, DC 20005
202-466-7643
Patient Information Line:
800-7-ASTHMA

Cancer Information Service
Office of Cancer Communications
National Cancer Institute
Building 31, Room 10A24
9000 Rockville Pike
Bethesda, MD 20892
800-4-CANCER

Centers for Disease Control and Prevention (CDC)
1600 Clinton Rd. NE
Atlanta, GA 30333
404-639-3311

Clearinghouse on Health Indexes
Division of Analysis
Office of Analysis and Epidemiology
National Center for Health Statistics
6525 Belcrest Rd., Room 790
Hyattsville, MD 20782
301-436-7035

Environmental Protection Agency
Public Information Center, PM-211B
401 M St. SW
Washington, DC 20460
202-260-7751

Epilepsy Foundation of America
4351 Garden City Dr.
Landover, MD 20785
800-332-1000

March of Dimes, Birth Defects Foundation
Public Health Education Department
1275 Mamaroneck Ave.
White Plains, NY 10605
914-428-7100

National AIDS Information Clearinghouse
P.O. Box 6003
Rockville, MD 20849
800-458-5231

National AIDS Hotline
English: 800-342-2437
Spanish: 800-344-7432
TDD: 800-243-7889

National Alliance for the Mentally Ill
2101 Wilson Blvd., Suite 302
Arlington, VA 22201
703-524-7600

National Arthritis and Musculoskeletal and Skin Diseases Information Clearinghouse
Box AMS
900 Rockville Pike
Bethesda, MD 20892
301-495-4484

National Clearinghouse for Maternal and Child Health
8201 Greensboro Dr., Suite 600
McLean, VA 22102
703-821-8955, ext. 254 or 265

National Depressive and Manic Depressive Association
730 N. Franklin St., Suite 501
Chicago, IL 60610
312-642-0049

National Diabetes Information Clearinghouse
Box NDIC
9000 Rockville Pike
Bethesda, MD 20892
301-468-2162

National Digestive Diseases Information Clearinghouse
P.O. Box NDDIC
Bethesda, MD 20892
301-468-6344

National Health Information Center
Office of Disease Prevention and Health Promotion
P.O. Box 1133
Washington, DC 20013
800-336-4797

National Heart, Lung and Blood Institute
Education Programs Information Center
P.O. Box 30105
Bethesda, MD 20824
301-251-1222

National Institute of Mental Health
5600 Fishers Lane, Room 7C-02
Rockville, MD 20857
301-443-4513

National Kidney and Urologic Diseases Information Clearinghouse
Box NKUDIC
9000 Rockville Pike
Bethesda, MD 20892
301-468-6345

Sex Information and Education Council of the United States (SIECUS)
130 West 42nd St., Suite 2500
New York, NY 10036
212-819-9770

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# Index


abstinence, 42
AIDS (Acquired Immune Deficiency Syndrome), 29
alcohol use, 3, 36, 40–41
alveoli, 51, 77
angina, 45
antibiotics, 11, 13, 14, 17, 77
antibodies, 19, 77
antigens, 18–19, 77
antihistamines, 26
anxiety disorders, 70–72
arteriosclerosis, 43, 44
arthritis, 59
aspirin, 23
asthma, 57–58
atherosclerosis, 43, 51, 77
autoimmune diseases, 58–59

B-cells, 18, 19, 78
bacteria, 7, 11, 12–13, 17, 78
behavior, *xi*, 3, 35–52
bipolar disorders, 68–69
borderline personality disorder, 70
breast cancer, 50
bronchi, 57, 78

cancer, 5, 36, 37, 45–50
candidiasis, 31
carcinogens, 38, 47, 78
carcinomas, 45, 78
cardiovascular disease. *See* heart disease
carriers, 14
cell-mediated immunity, 19, 20
cerebral palsy, 60
CF (cystic fibrosis), 54
chemical defenses, 16, 17
chemotherapy, 47, 78
chickenpox, 27
cholesterol, 44, 78
chronic diseases, *x*, 8, 35–52, 78
chronic obstructive pulmonary disease, 5, 36, 51
cilia, 16, 78
colds, 26
communicable diseases, 7, 8, 78
contagious period, 15, 78
coronary artery disease, 45

death, leading causes, *x*, 5, 35–36, 57
decongestants, 26
delusions, 66, 79
depression, 67–68, 69
diabetes, 5, 51, 55–56
diastolic pressure, 43, 79
diet and nutrition, 3, 37–38, 49
diphtheria, 22
disease, 7–8, 79
disease prevention, *ix*, 2, 4, 5, 6
Down syndrome, 53, 54, 64

eating disorders, 41
emphysema, 5, 36, 51
endemic diseases, 8, 79
environmental factors, 3–4, 57–58
epidemic diseases, 8, 79
epidemiology, 9, 79
epilepsy, 53, 60–61
exercise, 3, 36–37, 41

fetal alcohol syndrome, 41
fetal environmental factors, 3–4
fever, 20
fungi, 12, 14

germs. *See* pathogens

HDL (high-density lipoprotein), 44, 79
health, 1–4
health promotion and education, *xi*, 2, 6, 79
health services, 3, 4
heart attacks, 44, 45, 81
heart disease, 5, 36, 42–45
hemophilia, 54
hepatitis A (HAV), 27
hepatitis B (HBV), 25, 27, 28, 42, 49
hepatitis C, 27, 28
hereditary factors, 3, 4, 49, 53–56
herpes simplex, 28, 49

high blood pressure, 43, 45, 51, 79
HIV (human immunodeficiency virus), 29, 30, 54, 79
hypertension, 43, 45, 51, 79

illness, 7
immune response, 18–19
immune system, 15
immunity, 19, 20–21, 80
immunizations, 20–25
immunoglobulins, 19, 80
incubation, 15, 80
infectious diseases, 7–8, 11–34, 80
inflammatory response, 17, 20, 80
influenza, 23
interferons, 16, 80

LDL (low-density lipoprotein), 44, 80
leukemias, 46, 80
lice, 33
lifespan, *x*, 2, 3
lifestyle behaviors, *xi*, 3, 35–52
lipoproteins, 44, 80
liver diseases, 5
Lyme disease, 32
lymphocytes, 18, 80
lymphomas, 46, 80

malaria, 32–33
measles, 24
mental health, 63
mental health professionals, 72–74
mental illness, 63–75
mental retardation, 64
metastasis, 46, 80
mononucleosis, 27, 49
mood disorders, 67–69
MS (multiple sclerosis), 58–59
mumps, 25
muscular dystrophy, 55
mutation, 14, 81

natural defenses, 16–19
noncommunicable diseases, 7, 8, 81
noninfectious diseases, 8, 53–61

obesity, 41, 51, 81

pandemic diseases, 8, 81
parasites, 12, 14
pathogens, 7, 11–12, 15, 81
penicillin, 14, 17
phagocytes, 17, 81
phobias, 71
pneumonia, 5, 24
polio, 21
post-traumatic stress disorder, 72
pregnancy, 41
prevention, *ix*, 2, 4, 5, 6
psychosis, 65, 81
psychotherapy, 64

radiation therapy, 47, 81
reservoir, 15, 81
Reye's syndrome, 23
rickettsia, 12, 14
ringworm (tinea), 31–32
risk, 5, 82
Rocky Mountain spotted fever, 32
rubella (German measles), 24
rubeola (measles), 24

safer sex, 36, 42
safety belts, 36, 41
sarcomas, 45, 82
schizophrenia, 63, 65–66
sickle cell anemia, 55
skin cancer, 48
SLE (systemic lupus erythematosus), 59
smoking, 3, 36, 38–39, 47, 51
social relationships, 3, 4
SPF numbers, 48
sphygmomanometer, 43, 82
strep throat, 29
stress management, 36, 40
strokes, 5, 36, 44, 50–51
suicide, 5, 40, 69
systemic infections, 24, 82
systolic pressure, 43, 82

T-cells, 18, 19
Tay-Sachs disease, 55
TB (tuberculosis), 30–31
testicular cancer, 50
tetanus, 22
tobacco use, 36, 38–39, 47, 51
toxins, 13, 82
trichinosis, 33–34
tumors, 46, 82

UV radiation, 48

vaccines, 13, 14, 20–25, 82
viruses, 7, 11, 13–14, 49, 82

weight maintenance, 36, 41
wellness, 1
white blood cells, 17, 18
whooping cough (pertussis), 22

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